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PREFACE.

The publication and issue of a quarterly bulletin by the Bureau of Medicine and Surgery contemplates the timely distribution of such information as is deemed of value to the medical officers and the Hospital Corps in the performance of their duties and with the ultimate object that both shall continue to advance in proficiency in respect to all of their responsibilities.

It is proposed that the Naval Medical Bulletin shall embody matters relating to hygiene, tropical and preventive medicine, pathology, laboratory suggestions, chemistry and pharmacy, advanced therapeutics, surgery, medical department organization for battle, and all other matters of more or less professional interest and importance under the conditions peculiar to the service and pertaining to the physical welfare of the naval personnel.

It is believed that the corps as a whole should profit, to the good of the service, out of the experience and observations of the individual. There are many excellent special reports and notes beyond the scope of my annual report being sent in from stations and ships, and by communicating the information they contain (either in their entirety or in part as extracts) throughout the service not only will they be employed to some purpose as merited, but all medical officers will thus be brought into closer professional intercourse and be offered a means to keep abreast of the times.

Reviews of advances in medical sciences of special professional interest to the service, as published in foreign and home journals, will be given particular attention. While certain medical officers will regularly contribute to this work, it is urged that all others cooperate by submitting such abstracts from the literature as they may at any time deem appropriate.

Information received from all sources will be used, and the bureau extends an invitation to medical officers to prepare and forward, with a view to publication, contributions on subjects relating to the profession in any of its allied branches. But it is to be understood that the bureau does not necessarily undertake to indorse all views and opinions expressed in these pages.

W. C. BRAISTED,
Surgeon General, United States Navy.

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No. 1.

SPECIAL ARTICLES.

SHOCK, ANOCI-ASSOCIATION AND ANESTHESIA.

By A. M. FAUNTLEROY, Surgeon, United States Navy.

Shock, that insidious symptom complex of exhaustion, has long been regarded as the most formidable condition in major operative work and has occupied the attention of the best surgical minds for several decades. It was not, however, until the publication of the classical work of Crile and his associates that we have had presented a clean-cut and scientific understanding of the cause and pathology of shock, its prophylaxis and its treatment.

The so-called kinetic theory of shock would seem to be correct, in view of the many scientific and conclusive experiments which have been conducted in the laboratory and tried out in the crucible of the clinic. The elaboration of this theory calls for the recognition of several different kinds of shock which have received the names of the different prominent causes leading up to this condition. Thus we have traumatic or surgical shock, emotional shock, toxic or foreign proteid shock, drug shock, and the shock due to insomnia. Each and all give rise to the same pathological findings, differing only in degree, and are the result of the excessive conversion of potential, or stored-up, energy in response to adequate stimuli. Stimuli of sufficient number or intensity inevitably cause exhaustion, and these stimuli are received and transmitted to our consciousness through the medium of various forms of nerve endings, to which Crile has given the name of nociceptors, or ceptors which are activated by any noxious or harmful influences. These nociceptors may be the simple contact ceptors located in the skin or they may be specialized ceptors to be found in the special sense organs or situated in any cavity or tissue from which, on account of our evolutionary environment, we are in the habit of receiving notification as to the presence of injurious agencies or processes. Thus an environment or association which might result in injury to our health or life would be a noxious association and the converse of this condition, in which no harmful influences are present, has been given the name of anoci-association by Crile, which indicates a freedom from all injurious factors.

The harmful stimuli which are received and transmitted by the ceptors are immediately recorded in various cells of the brain, which latter reflexly activate the cells of certain other tissues with the idea of combating or otherwise offsetting the presence of the particular harmful condition or association. This response to the presence of some injurious agency is usually manifested in the form of muscular activity, since it is through our muscular system that we are able to escape from situations or conditions which the prolonged evolution of the race recognizes as harmful. Thus should we suddenly come in contact with a red-hot iron or a sharp piece of metal we immediately call into action certain muscles which bring about the movement necessary to rid us of the painful, and therefore harmful, influence. These responses to stimuli and the resultant action call for the expenditure of energy, or the vital force represented by a certain chemical compound, which is stored up in the cells of the brain, liver, suprarenals, and muscles. When this expenditure of vital force is prolonged or excessive an exhaustion of these cell storehouses or magazines is bound to occur, and this exhaustion, whether physical, emotional or otherwise, we designate as "shock."

All forms of shock stimuli cause physical alterations in the cells of the brain, suprarenals, and liver by reason of their activity, and these physical changes in the cells are identical, whatever the cause of stimuli, and they may become so altered that they can not be restored, but go on to annihilation. Traumatic or surgical shock, which results from a physical injury, is the particular kind of shock in which we, as surgeons, are most interested, although we can not ignore the other forms of shock which, in many instances, add their effect to complicate the picture or accentuate the condition of exhaustion. When a sudden violent injury occurs the stimuli are overwhelmingly intense and the kinetic system, represented by the organs named—especially the brain—is profoundly exhausted or even permanently injured, by reason of the sudden discharge of a large amount of stored-up energy in the futile and involuntary effort to bring about a correction of the condition causing the injury. This sudden exhaustion of the kinetic system, such as has occurred in prolonged operations, we call acute shock, but if the stimuli extend over a period of time, and are not so intense as to cause an immediate breakdown, there may be a gradual exhaustion of the kinetic system, which, though chronically induced, is to be regarded as shock. In other words, the activation of the kinetic system to the point of exhaustion, whether due to sudden or prolonged injury, is represented by the term "surgical" or "traumatic" shock. The changes leading up to this condition may be started by emotion, carried a step farther by muscular exertion, another step by physical injury, another

by hemorrhage, and so on until destroyed; or all the factors acting simultaneously may produce the same disastrous result.

The symptoms of shock are chiefly manifested by the phenomenon of lowered blood pressure; and the well-recognized apathetic and pinched facies, cold and clammy skin, rapid respiration and heart action, and the entire symptom complex, are all referable to this fall in the tone of the circulatory apparatus. The recognition of this fact, which is abundantly borne out by laboratory and clinical evidence, together with the now well-recognized pathology, gives us the key to the treatment in our effort to combat this condition. This treatment resolves itself into (1) the prevention of further shock and (2) the support of the circulation.

To accomplish this the surgeon must first check all hemorrhage, which in itself causes a special brain-cell deterioration, besides accentuation of lowered blood pressure; and after this, attention must be directed toward the relief of pain and the removal of anxiety and distress. Opinions differ as to the use of stimulating drugs in shock treatment. Crile maintains that they actually do harm, and he has demonstrated that shock can be produced by the administration of strychnin alone. DaCosta is firmly of the opinion that atropin is of great value in shock, especially when sweating occurs, while others strongly recommend repeated hypodermic injections of sterile camphorated oil. Although the infusion of salt solution into a vein gives but transient help in lowered blood pressure, it is a remedy of great value in emergencies, especially where there has been considerable loss of blood. DaCosta recommends the addition of adrenalin to the salt solution (1 teaspoonful of a 1 to 1,000 adrenalin chlorid solution to 1 liter of salt solution). Crile has undoubtedly established the fact that, in grave shock, the only remedy which affords permanent relief and brings about a stable reaction is the transfusion of human blood. He maintains that it is the one and only logical treatment of shock, and substantiates his claim by many and convincing proofs. There can be no doubt as to the value of transfusion, and it should always be resorted to when it is possible to accomplish it.

There are certain time-honored procedures which are also of undoubted value in the conservation of the patient's vital forces, such as covering with warm blankets to prevent the escape of bodily heat: the use of the hot-water bottle or hot bricks in the bed to compensate for the loss of heat; bandaging the extremities, or auto-transfusion as it is called, with the idea of increasing peripheral resistance and enabling the heart to utilize to the best advantage the actual or relatively small amount of circulating blood, thus carrying more blood to the brain where it will maintain the activity of the vital centers of respiration and circulation: proctoclysis and

hypodermoclysis are also among the palliative procedures and may aid in tiding over the patient. Besides the stimulating drugs already mentioned, the use of hypodermic doses of brandy and ether in beginning collapse has many advocates. While it is believed that there is a distinct indication in emergency work for certain of the stimulating drugs, particularly in certain cardiac cases, it is also the consensus of opinion that it is most unwise to advocate their indiscriminate use. In regard to the use of morphin there is quite a divergence of opinion. Crile lauds the use of this drug not only to relieve pain and apprehension when present, but also for its sedative action in limiting the expenditure of energy and thereby aiding in its conservation.

The term collapse is used by some to designate a severe condition of shock and by others to indicate a functional depression of the vasomotor center due to mental disturbance and cardiac failure rather than to a physical injury. Crile regards collapse as an inhibition of the vasomotor center in contrast to shock which is an exhaustion of the center. Concealed hemorrhage may present some difficulty to differentiate from shock, and this for the reason that shock and hemorrhage are often associated. Prolonged bleeding causes impairment of vision, frequent yawning, irregular tossing, great thirst, nausea, and sometimes convulsions or recurrent attacks of syncope. In pure shock these symptoms are not present. It has been demonstrated conclusively that severe hemorrhage always produces a special deteriorating effect of its own upon the cells of the brain, and when this effect on the cells is added to the exhaustion of the same cells through shock, the gravity of the latter condition is greatly increased.

As regards the prophylactic treatment of shock, the application of the kinetic theory toward the prevention of cell exhaustion, especially of the brain, resolves itself into doing away with, or blocking off, all noci-stimuli, both traumatic and psychic, thus approaching as near as possible that condition of complete freedom from all harmful and depressive stimuli known as anoci-association.

Unless a patient is of a very phlegmatic type, the contemplation of an operation is always accompanied by a more or less natural fear which may vary all the way from slight nervousness to a condition of abject terror. Such emotional stimuli cause a varying discharge of nervous energy, the exhaustive effect of which is in direct proportion to the degree of fear. After fear, anger is probably the emotion which causes most damage to the kinetic system. That combination of fear and anger known as worry has a chronic depleting action upon vital resistance, the exhausting and disastrous effects of which depend upon the degree of intensity. It represents, in the language of Crile, a state of bodily depression brought about by pro-

longed efforts to escape some threatening evil or futile attempts to combat the cause of some anticipated disaster. Thus this condition is responsible for grave digestive and metabolic disturbances which are well known to all.

In combating the effects of these shock-producing emotional stimuli our duty is plain. From the moment the patient is admitted he should be surrounded by an atmosphere of cheerfulness and kindness, which will do more to dispel his fears than all else. The avoidance of any factor that might cause irritation, such as an ungracious reception at the hospital, must always be borne in mind; and the patient should be made to feel that he is to be well cared for and that he will suffer no unpleasant experiences. The entire hospital organization, including surgeons, nurses, and attendants, in fact, all who come in contact with the patient, must be made to realize the importance of carrying out this detail of warding off all depressive, and consequently exhausting, stimuli. When this routine is followed the patient's vitality is conserved from the very start and he does not finally come to operation in a state of lowered resistance which would be superadded to the shock-producing stimuli of the operation itself. The preoperative treatment, such as cleaning out the alimentary canal, use of respiratory exercises, and attention to certain restrictions as regards diet and rest, is one of the steps to forestall and prevent certain disagreeable, and therefore exhausting, stimuli from occurring as a result of the anesthetic or operative procedure. This also includes the administration of morphin about one hour before operation, causing a mental and physical relaxation, which not only allays apprehension and softens the effect of any subsequent shock-producing stimuli, but has a decided influence in lessening the quantity of the anesthetic used or necessary to completely narcotize the patient, thus bringing about the reduction of a shock-producing agent. The patient should always be spared the sight of any operating instruments or paraphernalia and, at the same time, the sounds incident to the preparation for operation are to be excluded. In this way the patient sees and hears nothing that might cause apprehensive thoughts, and beginning his anesthetic under circumstances entirely removed from all suggestive depressing stimuli, he passes unconsciously from the condition of calm repose induced by the morphin to a state of surgical anesthesia.

Having arrived at the point where the operation is about to begin, the final phase in the anociation of the patient is started by cocainizing the nerve ends throughout the line of incision, and from this time on every division of a sensitive tissue—that is, of a tissue supplied with nociceptors—is preceded by infiltrating with a solution of cocain or novocain. Although the patient is completely under the general anesthetic and can make no voluntary movements, unless

the tissues are thus anesthetized locally the nociceptors are still as capable as ever of receiving and transmitting to the brain traumatic stimuli. The brain cells being activated by these stimuli, there is a corresponding discharge of nervous energy in the unconscious effort to protect the body from further injury. The voluntary muscles being unable to act, the nervous discharge of energy expends itself on the cells of the suprarenals and liver, which organs are the only ones beside the brain to show structural cell changes. Thus, when there is no regional anesthesia, and the operation is prolonged and also accompanied by considerable traumatism of the parts, there is brought about gradually a tremendous discharge of energy from the brain, with consequent cell deterioration and ultimate cell exhaustion in the organs named, especially the brain. When this condition is reached the patient is said to be "shocked," and if the condition is allowed to continue profound exhaustion ensues and the manifestations of grave traumatic shock are apparent.

With the exception of the shock-producing stimuli from the anesthetic itself, this condition can be completely obviated, and all traumatic stimuli cut off from the brain by the use of regional anesthesia, which consists of blocking off completely the reception of stimuli by the nociceptors. For this purpose Crile uses a 1 to 400 solution of novocain in all parts of the body, in all ages and under all conditions. Mitchell's tablets of cocain gr. $\frac{3}{4}$ and adrenalin 1 to 400 is also used for the same purpose in solutions of two strengths. The stronger solution, which consists of one tablet to 50 c. c. of sterile water, is used in infiltrating the more sensitive parts, such as the skin; while the weaker solution, one tablet in 100 c. c., is used for less sensitive tissues, such as muscles and fascias. Which-ever one is used the infiltration is started by inserting the needle between the superficial and deep layers of the skin (not under but in the skin) in such a manner as to cause, when the solution is injected, a pigskin appearance or the production of small wheals in the skin. The needle is pushed along parallel with the surface while making the injection, until the syringe is emptied, and it is repeated until the line of the proposed incision is completely covered with the small wheals. These solutions should be most carefully prepared and sterilized before using, and, in addition to their use with a general anesthetic, operations of considerable magnitude can be safely and painlessly performed under local anesthesia alone. Just before completing the operation Crile injects at a distance from the wound a $\frac{1}{4}$ per cent solution of quinin and urea hydrochlorid to minimize the postoperative discomfort in the wound, especially in abdominal operations, and this local anesthesia lasts for several days. During the operation the tissues should be subjected to the least amount of trauma, such as gentle manipulations,

clean-cut dissections, with the minimum of pulling, stretching, tearing, and crushing.

The postoperative care in general is directed toward making the patient as comfortable as possible in bed; prompt relief of pain and restlessness with small doses of morphin; and rectal tap water by the drop method, containing sodium bicarbonate and glucose, one ounce of each to the quart. An enema is given on the second day and always resorted to whenever there is flatulence, and, unless especially contraindicated, the nourishment is rapidly increased both in quantity and quality, except in gastric cases, until the patient receives a fairly liberal diet about the fourth day. When stimulants are necessary in certain cardiac cases Crile gives camphorated oil and digitalis.

ANESTHESIA.

There is a wide difference of opinion among surgeons of high standing and large experience as to the anesthetic of choice. This diversity of opinion but accentuates the fact that the ideal anesthetic has yet to be discovered. To meet the requirements of modern surgery there are a number of factors to be considered if one is to nominate the qualities that this ideal anesthetic is to possess. Unfortunately, the conditions which would allow for a determination of these qualities are not uniform in the practice of surgery, and the anesthetic of choice in a well-equipped hospital might fall far short of satisfying the demands of the surgeon whose work calls for an anesthetic under conditions which are far from ideal. In this latter category would fall a great number of anesthetics that have to be conducted in general work which, for one reason or another, are administered outside of an ideal hospital and under circumstances by no means always advantageous. Particularly is this true in military and naval work, although the average civilian practitioner is oftentimes confronted by conditions equally as hard to meet.

Among the general anesthetics ether, chloroform, and nitrous oxid-oxygen are the ones in common use, and each of these has its adherents, who present various substantial reasons for adopting one or the other as the anesthetic of choice. Aside from other important considerations, there is one factor, the expert knowledge of administration, which is often overlooked or not mentioned in discussing the merits of an anesthetic, and this factor alone is of prime importance as regards the selection of the one to be used. Whereas ether is justly regarded as safer than chloroform, and nitrous oxid-oxygen as probably safer than both, nevertheless in expert hands either one of these anesthetics, unless especially contraindicated, can be used with practically equal safety. An anesthetic which might be perfectly safe in the hands of one who understands thoroughly its

administration would be highly unsafe—in fact, poisonous—in the hands of another who is not especially trained in its use. This one fact alone should be the first consideration in determining the choice of an anesthetic, regardless of what might be the indications, for it would be most unwise to select an anesthetic, even when the others are apparently contraindicated, if the anesthetist is not sufficiently familiar with the use of the one selected, thereby greatly jeopardizing the life of the patient or the results of the operation. In this connection familiarity in the use of an anesthetic not only has a direct bearing on operating-room statistics, but no doubt accounts, in great measure, for the decided opinions which are expressed as to the relative safety of anesthetics. It is but natural for one to strongly advocate an anesthetic with which he is not only thoroughly familiar but also with which he has obtained the best results through skillful administration.

The other factors that influence the choice of an anesthetic are those which have a direct bearing on the physiological action of the drug with reference to the vital functions of circulation and respiration, or an exhaustion of these functions known as "shock." The mechanism of shock, although entirely dependent upon the integrity of the above functions as controlled by the brain, is so important as to warrant it being considered apart and as a definite pathological entity. In addition to this, and as a corollary to considering the functions of circulation and respiration, the condition of the organs involved in the vital processes must not be overlooked in the choosing of an anesthetic, such as when cardiac, renal, and respiratory diseases are present. In view of these latter, certain indications and contraindications have been advanced as regards the choice of an anesthetic, although it is to be recognized that these considerations are entirely relative, and by no means always indicate the use of one or the other anesthetic. It must also be borne in mind that the views with reference to the indications are not always free from a certain biased attitude on the part of those who are strongly influenced one way or another, and hence the conflicting testimony to be found along this line in surgical literature.

A good many of the objections that are advanced with reference to this or that anesthetic, as regards relative safety or ease of administration, can be largely overcome by a better acquaintance with the particular anesthetic and a consequent improvement in technique. An anesthetic, or a certain technique, may be condemned because of a lack of knowledge or training in the finer points of administration, which, if more thoroughly understood or worked out, would always greatly improve the practical value of the anesthetic. It can be readily understood that any state of induced general anesthesia is an abnormal condition, and for this reason there will probably never be

an anesthetic which will not cause, in some way, a certain degree of harm or lowered resistance as compared with the natural or normal state. Hence it is that those who are not accurately familiar with the use of an anesthetic will increase the deleterious effect on the patient in proportion to their lack of knowledge and their inability to master the details of correct administration.

Ether, as a surgical anesthetic, was first employed in 1842 by Dr. Long, of Jackson County, Ga. Unfortunately, he made no effort to acquaint the world at large of his discovery until Dr. Morton, of Boston, announced his successful administration of ether four years later, in 1846. Since that time many methods of giving ether have been brought forward in an effort to improve its administration and meet the special demands of surgical development. Thus we have the closed method, the open or drop method, the various ether sequence inhalation combinations, the intravenous method, the rectal method, the intratracheal insufflation method, and several other modifications.

The physiological action of ether in the production of inhalation anesthesia may be summed up as follows: It is a powerful stimulant to the respiratory system during the earlier stages of administration, and later on causes a slowing of respiratory movements and a decrease in depth, especially if pushed beyond the point of safety. Hence the rate and depth of breathing are the safest guides as to the degree of anesthesia, since the respiratory system is affected before the circulatory. It is a direct heart stimulant during the earlier stages of its administration, the pulse is accelerated, and the blood pressure is slightly raised or remains constant. Only in the later stages of anesthesia, or when a toxic amount is employed, does ether become a circulatory depressant. Reports as to the effects of ether narcosis on the kidneys are somewhat conflicting, but would seem to indicate a mild irritant effect, although vascular renal stasis is induced by toxic doses. There is also a stimulating and irritant effect upon the mucous membrane of the air passages, producing a hypersecretion of mucus which is of clinical importance. The salivary glands are likewise affected, and when the excessive secretion is swallowed post-anesthetic vomiting is apt to occur. Ether is apt to excite an overactivity of the mucous glands of the stomach and intestines, causing retching and vomiting during and after the administration. Ether in connection with shock and other pathological conditions will be discussed later on.

In fatal ether toxemia respiration fails before circulation. Hewitt points out that the circulation at the moment when breathing ceases is sufficiently satisfactory for restorative measures to be almost invariably successful, and the heart is not likely to fail unless these measures are too long delayed. While the heart may be arrested in

diastole by ether, a fatal case of reflex inhibitory arrest has never been reported.

The effects of ether upon the nervous system, as observed clinically, are to be seen in connection with the four stages of anesthesia. The first effect is one of stimulation, but with increasing dosage there is a progressive paralysis of the central nervous system, the phenomena affecting the centers in the following order: (1) The higher cerebral centers, involving the intellectual faculties; (2) the lower cerebral centers, involving sensation and motion; (3) the spinal cord, involving sensation and motion; (4) the medullary centers, involving vital functions.

When ether is administered according to the most modern technique, the subject, as a rule, passes quietly into the stage of surgical anesthesia. However, there may be individual variations, and should the anesthetic be clumsily given, without due regard to careful technique, the stages of anesthesia are quite well marked.

The first stage usually lasts about two minutes. During this time the respiration is accelerated, blood pressure slightly increased and the pulse full and bounding. If the vapor is administered in too great concentration, there may be holding of the breath, swallowing, a feeling of suffocation, muscular rigidity, coughing, and turning the head from side to side. While these latter symptoms are indicative of a faulty technique in not providing more air, a supersensitiveness to the drug may be obviated by preliminary inhalations of a 25 per cent oil of bitter orange peel with 75 per cent of alcohol. It is during this first stage of ether anesthesia that there is a varying and transient period in which minor operative procedures can be carried out, such as pulling a tooth or opening an abscess, but it must be understood that only work of a momentary character is to be undertaken at this time.

The second stage, or stage of excitement, is only apparent, as far as excitement is concerned, when the anesthetic is not smoothly given with reference to the individual case and modern technique. In any event, during this stage, there is a loss of consciousness with consequent interference with memory, volition, and intelligence. The subject in this stage responds to stimuli and may give evidence of apparent consciousness, while incoherent talk, crying, or laughing, singing, or shouting, and struggling may initiate a typical stage of excitement. When excitement supervenes there usually follows a train of symptoms in sympathy with a too rapid stimulation of the lower medullary centers, such as irregular respiration or even apnea, the so-called "ether tremor," free secretion of mucus and saliva, and perspiration over the face and other parts of the body. As the anesthetic deepens rigidity of the muscles becomes marked with clonic and tonic contractions of certain muscles, notably those of the jaw

and larynx. The pupils are dilated but mobile, pulse full and bounding, and the face is flushed. Cyanosis occurring at this time points to some obstruction to the passage of air, while vomiting would occur only during the transition from the second to the third stage.

The third stage, or stage of surgical anesthesia, is important to recognize, as it is the stage in which the patient is to be kept during the operation. Here the respirations are full, regular, and generally audible. A soft stertor may be considered normal, but if the breathing becomes strongly stertorous it is an indication of some obstruction in the air passage. The respirations are the principal guide as to the depth of narcosis. Regular, automatic breathing should be regarded as standard, and a decrease in depth and amplitude of respiration indicates a return to consciousness, while a marked stertor calls for changing the position of the lower jaw or head and, if continued, an investigation of the pharynx. While the face may be more flushed than normal, cyanosis should not be present. The heart action is accelerated and the pulse full, bounding, and regular. The pupils, if not affected by preliminary medication, may be slightly dilated, though reacting to light, while the eyeballs are generally fixed. There is now a relaxation of all the muscles and this condition is maintained, depending on the general conduct of the operation.

While the indications of returning consciousness are, in general, a retrograde transition to the second stage, marked by the return of reflexes, the fourth stage, or stage of overdose, is marked by general weakness and irregularity as regards the respirations and heart action. The pupils become markedly dilated and do not react to light. Cyanosis is present and blood pressure rapidly falls. The first indications of the onset of this stage are quiet, feeble respirations and irregular pulse. After this the eyelids become separated, with the eyeballs fixed and dry; the muscles are flaccid, and continued drenching with ether will shortly bring about paralysis of respiration, followed quickly by cardiac failure.

In general, ether is indicated whenever deep anesthesia is desired, as for amputations, dislocations, genito-urinary operations, and laparotomies, and is far more suitable in all conditions of shock and collapse than chloroform. While Kocher maintains that respiratory disturbances, particularly with dyspnea, are contraindications to the use of ether, Rovsing and others have demonstrated that not only will careful administration obviate any harmful effects, but in most cases the condition is improved as a result. Unless the kidneys are badly damaged, ether will cause no more harm than other general anesthetics. Ether has been condemned by some writers for brain and neck work on account of the venous engorgement, while others of large experience in the same localities, notably the Mayos, prefer

ether, by the open method, to all other anesthetics. In any condition with high blood pressure, and in aneurism and atheroma, ether is contraindicated. Elderly people, drunkards, and heavy smokers do not usually take ether well, and, according to Mortimer, infants and young children are also unfavorable subjects. Local anesthesia is beginning to play an important rôle in the cases where it seems advisable not to administer ether or any other inhalation anesthetic.

From a practical standpoint the administration of ether resolves itself into two methods, the open and the closed, with various modifications to suit individual cases and the operator's preference. While it would be folly to condemn any one method, well-founded objections have been raised from time to time in connection with the unrestricted use of any particular procedure. This has led not only to improvement in technique, but also to progress in the direction of overcoming difficulties and increasing the margin of safety until, as Gwathmey says, the indications for ether almost parallel the indications for operation, except for very short surgical interventions. Other things being equal, the method to adopt is the one with which the anesthetist is most familiar, thereby insuring greater safety to the patient. DaCosta emphasizes the fact that the administration should never be intrusted to a novice, and for some years in the larger surgical centers there has been a growing realization of the importance of developing experts.

In the open or drop method the mask may be any one of a number of useful inhalers, such as the Ferguson, Gwathmey, or Allis; and having made suitable preparation to meet all emergencies, the induction of anesthesia is begun. This, according to Davis, is as follows: "Place a piece of rubber protector over the patient's eyes to shield them from the ether vapor. Protect the face with a moist towel or gauze which extends over the rubber tissue and around the chin. Use a wire frame mask similar to the Esmarch chloroform inhaler, only larger, in order to give more space under the inhaler for the admixture of air and ether. Cover the wire frame with one or two layers of stockinet or several layers of gauze. The gauze should be thrown away and the wire frame boiled after each administration.

"Apply the mask to the patient's face and administer the ether drop by drop, very slowly at first, then gradually increasing as the patient is able to take the stronger vapor. When the patient can not respond to questions, a moist towel or gauze is wrapped snugly around the mask, leaving a small area in the center for the free passage of air through the gauze. By this method the air is prevented from escaping around the edges of the mask, and is made to pass through the ether-laden gauze. The ether should not be dropped down faster than the patient can comfortably breathe it in. Never be in a hurry to put the patient to sleep. Do not let an impatient

operator worry or hurry you on, as the welfare of the patient depends upon the slow and gradual ratio of the increasing concentration of ether vapor. The patient will become unconscious in two or three minutes, and should be ready for the operator in 10 minutes. After the patient has become completely anesthetized very little ether, dropped slowly, but continuously, will suffice to maintain the proper condition. Having reached surgical anesthesia, the further efforts of the anesthetist should be directed to observing the respirations, pulse, and pupils, and the patient's general condition, and to preventing him from passing into that dread stage of respiratory paralysis. The respiration should be quiet, with perhaps a slight snore. Panting and rapid breathing, or irregular or stertorous breathing, indicate that the patient needs more air."

The use of oxygen with ether is often advantageous, particularly in diseases of the respiratory tract, as in empyema and emphysema. Whenever cyanosis tends to occur oxygen should be given with the ether, even though it tends to prolong the process of anesthetization. It may be given by inserting beneath the inhaler the tube attached to a reservoir of oxygen.

The early objections to the drop method was that it not only caused great refrigeration, which was harmful in many ways, but it prolonged considerably the earlier stages of anesthesia, particularly in robust subjects and alcoholics. When the technique of surrounding the mask with a towel is followed, as noted above, these objections are largely done away with, in that the patient does not blow the vapor into the air, and he does not get the cold vapor that sinks through the mask with consequent refrigeration. In this connection, Davis has perfected a heater for warming not only ether but other anesthetics.

Gwathmey and Baskerville lay down the following rules with reference to emergencies during anesthesia: When respiration ceases the first thing to do is to give the patient a quick, hard slap on the chest. If this does not start the respiration, the next movement is to place the hands upon the side walls of the chest and press very hard several times in succession. If the patient does not begin to breathe immediately the following procedures must be carried out quickly: (1) Insert a mouth gag and pull the tongue well forward. (2) Lower the head, and while this is being done pressure upon the side walls of the chest must be continued. As soon as the Trendelenburg position is reached Sylvester's method of artificial respiration is begun. At the same time one assistant dilates the sphincter ani and another vigorously massages the precordial region. If these procedures are not effective in two minutes the pulmotor is to be used or the Lewis pendulum swing should be attempted. Care should be

exercised that the accumulations of mucus and saliva in the upper air passages are swabbed out or withdrawn by suction.

If the fourth stage is brought on by hemorrhage or shock the anesthetic is not only stopped but the Trendelenburg position is maintained, with bandaging of the lower limbs to force the blood to the trunk, and an intravenous saline infusion with adrenalin is begun. Sometimes a hot rectal saline infusion or hypodermoclysis are very useful in anticipating the fourth stage. In addition to this hot blankets and bottles must surround the patient, and in extreme cases of syncope DaCosta not only gives hypodermic injections of atropin but also ether and even ammonia. Direct massage of the heart by opening the chest is a very doubtful procedure, but subdiaphragmatic massage through an already open abdominal wound has been reported several times as a success.

There are several semiclosed methods, of which the so-called handkerchief method has probably given the best results. The cone is made by arranging a towel or handkerchief over several layers of stiff paper with either a thick diaphragm of wadded gauze at the top, or the latter may be closed in. It is not to be recommended as routine, but as a handy expedient in an emergency. The ether is either poured into the cone from time to time or it may be dropped continuously upon the diaphragm of gauze.

The closed method of ether administration was the immediate precursor of the gas-ether sequence and consisted of an inhaler with an attached rubber bag for the ether vapor, which latter was re-breathed, causing it to be warmed and refrigeration thus prevented. Although popular in England it never became so in America, where little notice was taken of it until an adaptation of the method in the form of a nitrous oxid gas-ether sequence was developed. This latter method consists of giving one or two bags full of gas and, while the patient is unconscious, gradually turning on the ether. It was claimed to be a much pleasanter and shorter method of giving ether and it has had many advocates in this country. A number of excellent, though somewhat complicated, gas-ether-air inhalers are in use, such as the Bennett, Gwathmey, and Davis inhalers, some of which have other ether sequences, such as chloroform, ethyl chlorid, and oxygen in combinations. On account of the more or less complicated apparatus, requiring usually a specially trained anesthetist, and on account of the difficulties in connection with emergency work, this method is not regarded with favor by the majority of surgeons. It may be looked upon as one of the refinements of anesthesia to be used in specially indicated cases where ether alone, for one reason or another, is not borne well. In a well-equipped hospital one of these inhalers should be on hand to be used when indicated by necessity.

The intratracheal insufflation method has been developed in connection with intrathoracic operations to prevent collapse of the lungs. The patient is first anesthetized in the usual way and, when unconscious, a flexible elastic tube is carried down almost to the tracheal bifurcation, under the guidance of the eye and by means of a direct laryngoscope. It is claimed for this method that there is less shock and post-operative vomiting, particularly if given as a nitrous oxid-oxygen-ether sequence. In operations about the head, mouth, and neck it keeps the anesthetist out of the operator's way and in goiter operations it is a safeguard against sudden suffocation. It is a method that requires considerable skill and experience to administer without injury to the patient and with satisfaction to the surgeon.

Rectal etherization is another method to prevent the anesthetist from interfering with the operator in operations upon the face, tongue, pharynx, and larynx. This method not only takes much longer but is regarded as much more dangerous than the inhalation method. It usually has many distressing sequelae and has been entirely supplanted by the intratracheal insufflation method.

Intravenous etherization is still on trial. In this method a $7\frac{1}{2}$ per cent of ether in normal salt solution is usually employed. Morphin, atropin, and scopolamin are given beforehand. A vein is isolated in the usual way and from one-half to a pint of the warm solution is allowed to run in. Complete anesthesia is secured in from three to five minutes and is maintained by a constant succession of drops into a fresh salt solution slowly introduced. This method not only keeps the anesthetist out of the way but it is claimed that the dose of the anesthetic can be much more accurately measured than by the inhalation method. The same precautions are necessary as in respiratory anesthesia. Hedonal is also being used for intravenous anesthesia in a $7\frac{1}{2}$ per cent solution in normal salt solution, given continuously. It is too early to pass final judgment upon the intravenous method, as it has received recognition only in certain European centers, notably Petrograd.

Chloroform as a practical anesthetic was first made use of by the Edinburgh obstetrician, Dr. J. Y. Simpson, in 1847 as an effort to secure a more agreeable anesthetic than ether. It quickly supplanted ether for a while until reports began to show it to be a more dangerous anesthetic. There can be no doubt that on account of the insidious action of chloroform it is far more unsafe in unskilled hands than ether, and, aside from the early sudden deaths that have been reported from its use, the symptoms of overdose come on so gradually, being much harder to recognize than with ether, that the patient is often practically dead before effective restorative measures can be brought to bear. It might be said that the symptoms of ether poisoning are so clumsily manifested as to call attention to their

presence more quickly, whereas in chloroform poisoning there is so little warning that often there is not time to accomplish the emergency measures. Again, in keeping a patient in the surgical anesthetic state the zone of safety is not as broad with chloroform as with ether, and this latitude of restricted usefulness in the third stage of chloroform anesthesia is such as to make it easier for the patient to either come out from under the anesthetic or slip over into the fourth or paralytic stage. All this points to the fact that the chloroform anesthetist, as a rule, has to be much more attentive than the ether anesthetist, and that it requires much more skill and experience to administer chloroform safely than it does to administer ether safely. From this it can be seen that although chloroform may be administered with comparative safety by an expert, it is relatively more dangerous than ether.

Aside from its action on the higher cerebral centers, chloroform, in contrast with ether, affects the circulatory system primarily and the respiratory system secondarily. Even in this secondary action the effects are largely dependent upon the low arterial tension, although the respiratory system, even to the extent of complete cessation of breathing, is also affected through the action of chloroform on the nervous mechanism of respiration. In this latter action it is practically identical with ether, and it also exerts, though in a much milder degree than ether, the same general effects upon the respiratory system. According to Gwathmey, the vasomotor center is primarily stimulated by chloroform and does not become paralyzed by the direct action of the agent until the stage of deepening narcosis, when death is imminent.

Experimental evidence is very conflicting as to the exact reason why chloroform acts as a heart depressant, the question being whether the effects are produced directly upon the cardiac muscle or whether through the inhibitory action of the vagus. That it does exert a specific depressant action on the heart all agree, but whether directly or indirectly is yet to be decided. There is abundant proof that chloroform tends to paralyze the neuromuscular mechanism of the blood vessels and, as Gwathmey says, it is now generally conceded by clinical observers that a dilatation of the entire cardiovascular system follows the inhalation of chloroform, and the fall of blood pressure is thus accounted for. Hewitt says that chloroform is a powerful protoplasmic poison, with apparently no specific action on any particular center or organ. At the same time there is a great deal of experimental and clinical data that points to a reflex stimulation of the vagus, causing sudden inhibition of cardiac pulsation, which is responsible for the sudden death from cardiac syncope in the first stage of anesthesia. As regards the kidneys, it is generally believed that chloroform exerts a less harmful irritating effect on a

damaged kidney than ether. There is also a well-founded belief that chloroform does not stimulate the flow of mucus, in both the respiratory and digestive tracts, to the extent that ether does.

The effect of chloroform on the voluntary muscles has a direct bearing on the administration, particularly in the third or anesthetic stage. Muscular relaxation usually occurs at this stage, but not infrequently clonic spasms of certain muscles, particularly of the fingers (piano-playing movements), may be noted. There may also be slow coordinate movements, or jerky adductor movements, of the arms. Occurring at this stage an inexperienced anesthetist may ply the patient with more chloroform, thinking that there is a lapse to the second stage, and thereby greatly endanger life on account of the narrow margin that exists between the therapeutic and the toxic dose of chloroform. There is a decided tendency to tonic spasms during the earlier stages of chloroform in the muscles of the extremities, abdomen, chest, larynx, neck, and jaws. On this account there may be spasmodic tongue retraction, giving rise to stertor and stridor from obstruction, while there is also a tendency later on to a falling back or "swallowing" of the tongue, which also causes symptoms of obstruction.

The effect of chloroform upon the nervous system has already been foreshadowed by reference to the different stages of the anesthetic condition. Like ether there is an arbitrary division into four stages of anesthesia, the general symptoms of which, with few exceptions, are practically the same for both drugs. This latter statement applies strictly to the higher cerebral functions. Attention is again invited to the physiological effects of chloroform to emphasize the important changes in the lower medullary and spinal cord centers. These changes are not the same for ether and are to be noted in the primary cardiac and general circulatory depressant action of chloroform, with a secondary respiratory depressant action; in the sudden reflex cardiac inhibitory action occurring sometimes in the earliest stage of chloroform anesthesia; in the lessened irritant effects of chloroform on the mucous membranes; and in the more pronounced effect upon the voluntary muscles than ether. In addition to this it is usually more agreeable to the patient and is quicker in its action than ether. While the general preparation for, and the handling of, emergencies is practically the same for both drugs, it must be remembered that chloroform demands the undivided attention of the anesthetist and a prompt action on his part to counteract any harmful effects. In view of the apparent specific action of chloroform on the heart, the anesthetist must be prepared to exert prompt and powerful cardiac stimulation when sudden syncope occurs.

The indications for chloroform have been practically outlined under ether. They may be enumerated as follows: (1) Very young or very old people; (2) insane patients; (3) serious affections of the respiratory apparatus; (4) aneurism and atheromatous arteries; (5) operations in which the actual cautery is to be used close to the face; and (6) operations upon the brain. The contraindications are given as follows: (1) Very prolonged operations; (2) when low blood pressure or cyanosis are already present; (3) general septic conditions; (4) diabetic patients; (5) myocardial and valvular diseases; and (6) all operations where for any reason the patient has to be placed in a sitting posture.

The drop method of administering chloroform has long been considered the safest procedure when it is given alone. It is important that the patient should always be recumbent with the head on a line with the body. As the vast majority of chloroform fatalities reported have occurred in the first few minutes of administration, the patient should always have preliminary medication and be reassured as to any harmful effects in order to offset any psychical element. The following is Gwathmey and Baskerville's method of induction: "A few drops of Farina cologne are dropped upon the mask. This should be supplemented in one-half minute by one or two drops of aromatic spirits of ammonia, or preferably a few drops of an alcoholic solution of the oil of bitter orange peel. The first drop of chloroform can now be administered, and in 30 seconds the second drop; that is, 2 drops the first minute. This can be increased to 6 drops the second minute. The third minute, 2 drops may be given every 10 seconds; the fourth minute, 3 or 4 drops every 10 seconds; the fifth minute, 5 to 10 drops every 10 seconds. If the patient is not in full surgical anesthesia by this time, the administration may be continued as follows: Eight or 10 drops every 10 seconds for 1 or 2 minutes longer. No time is wasted by beginning the administration of chloroform very slowly. The mucous membranes are, in a measure, blunted and, if conducted methodically this way, the surgical stage will be ushered in by the automatic respirations of the patient, the first and second stages not being observed ordinarily. When the surgical stage is reached it is well for the anesthetist to continue dropping the maximum amount for 1 or 2 minutes and then go back to 3 drops every 10 seconds for the next minute or so, and then to decrease this amount to 2, or increase to 3 or 4 drops every 10 seconds continuously, and after that depending upon the patient's reflexes. It usually requires from 4 to 8 minutes to reach full surgical anesthesia, and in this stage the pupil contracts to normal, the respirations become regular and automatic, the reflexes disappear, the pulse slows down or is normal, and, with chloroform alone, the face is usually pale. The patient must be

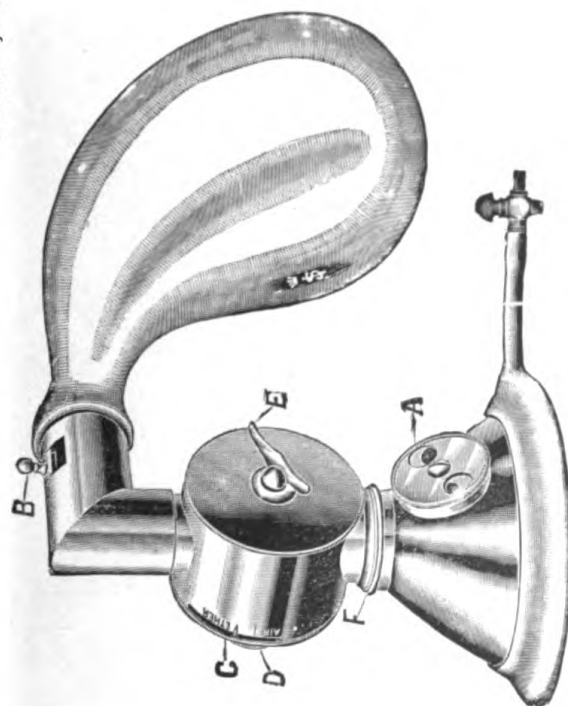


FIG. 1.—BENNETT'S ETHER INHALER.

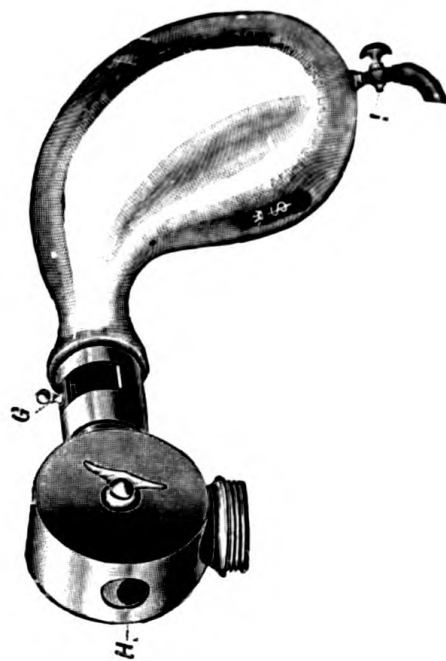


FIG. 2.—GAS ATTACHMENT FOR BENNETT'S INHALER.

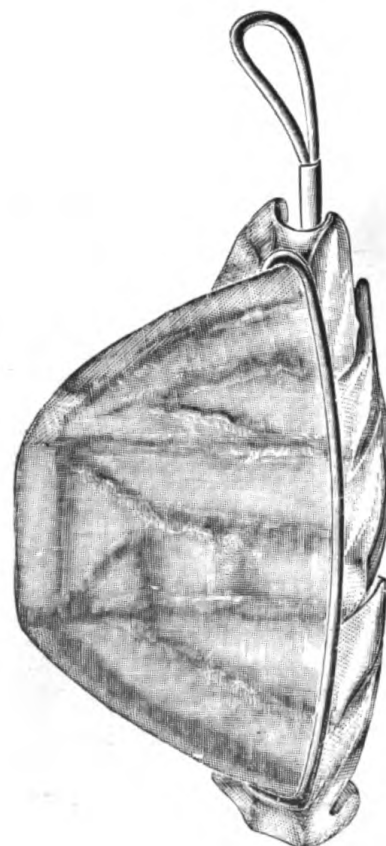
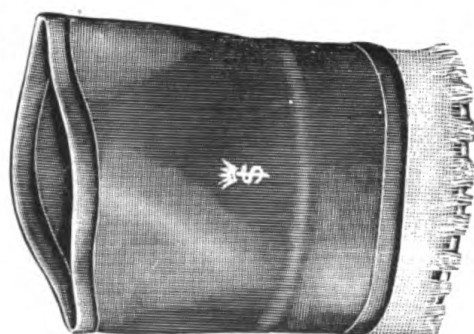


FIG. 3.—ALLIS'S ETHER INHALER.
FIG. 4.—JULLIARD'S ETHER MASK.

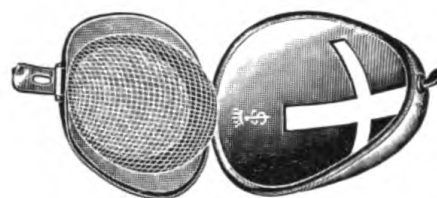
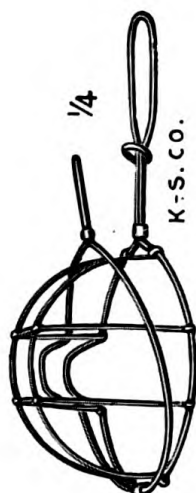


FIG. 5.—SANDERS'S ETHER MASK.
FIG. 6.—LAPLACE'S ASEPTIC MASK
FOR ETHER OR CHLOROFORM.

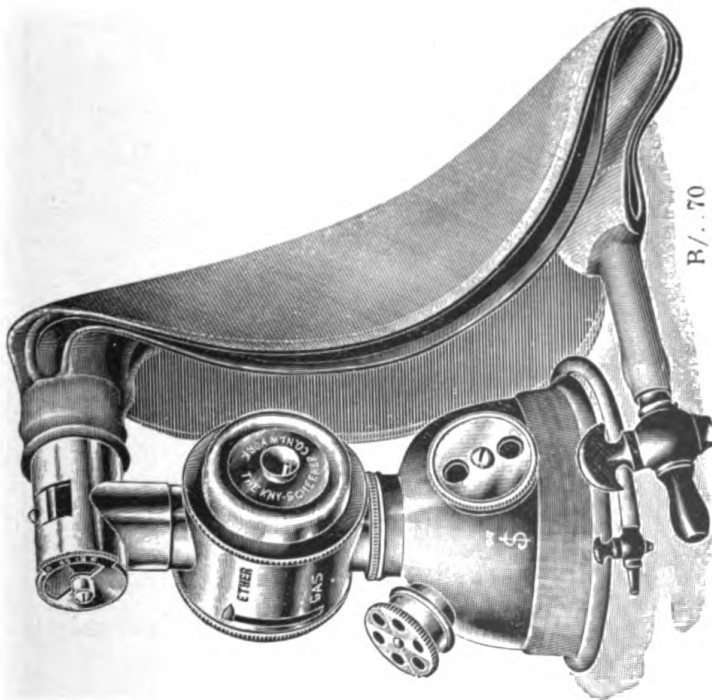


FIG. 7.—GWATHMEY'S INHALER.

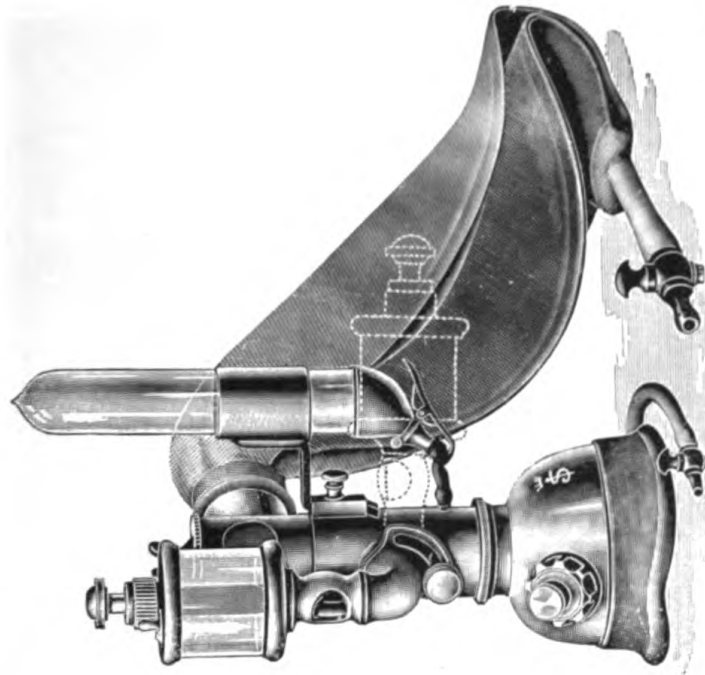


FIG. 8.—DAVIS'S INHALER FOR CHLOROFORM, ETHER, ETHYL-CHLORID, OR GAS.

Fauntleroy—Shock and Anoci-Association.

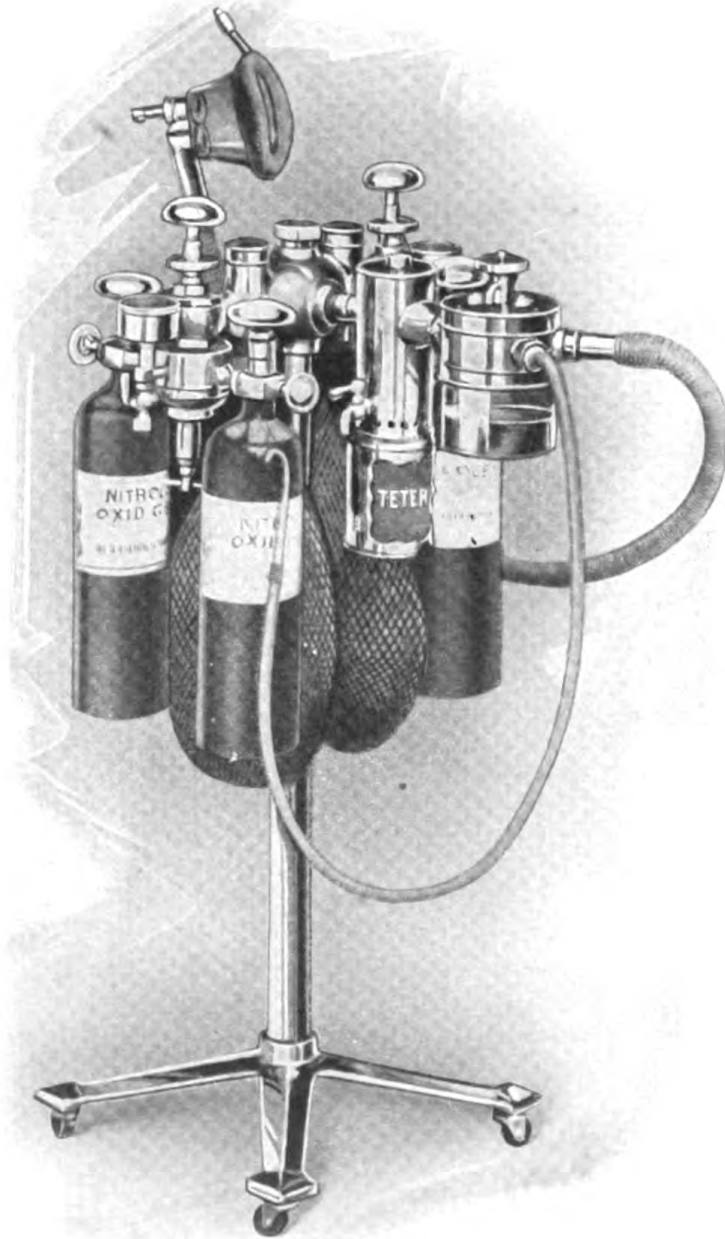


FIG. 9.—TETER'S NITROUS OXID-OXYGEN-ETHER APPARATUS.

Fauntleroy—Shock and Anoci-Association.

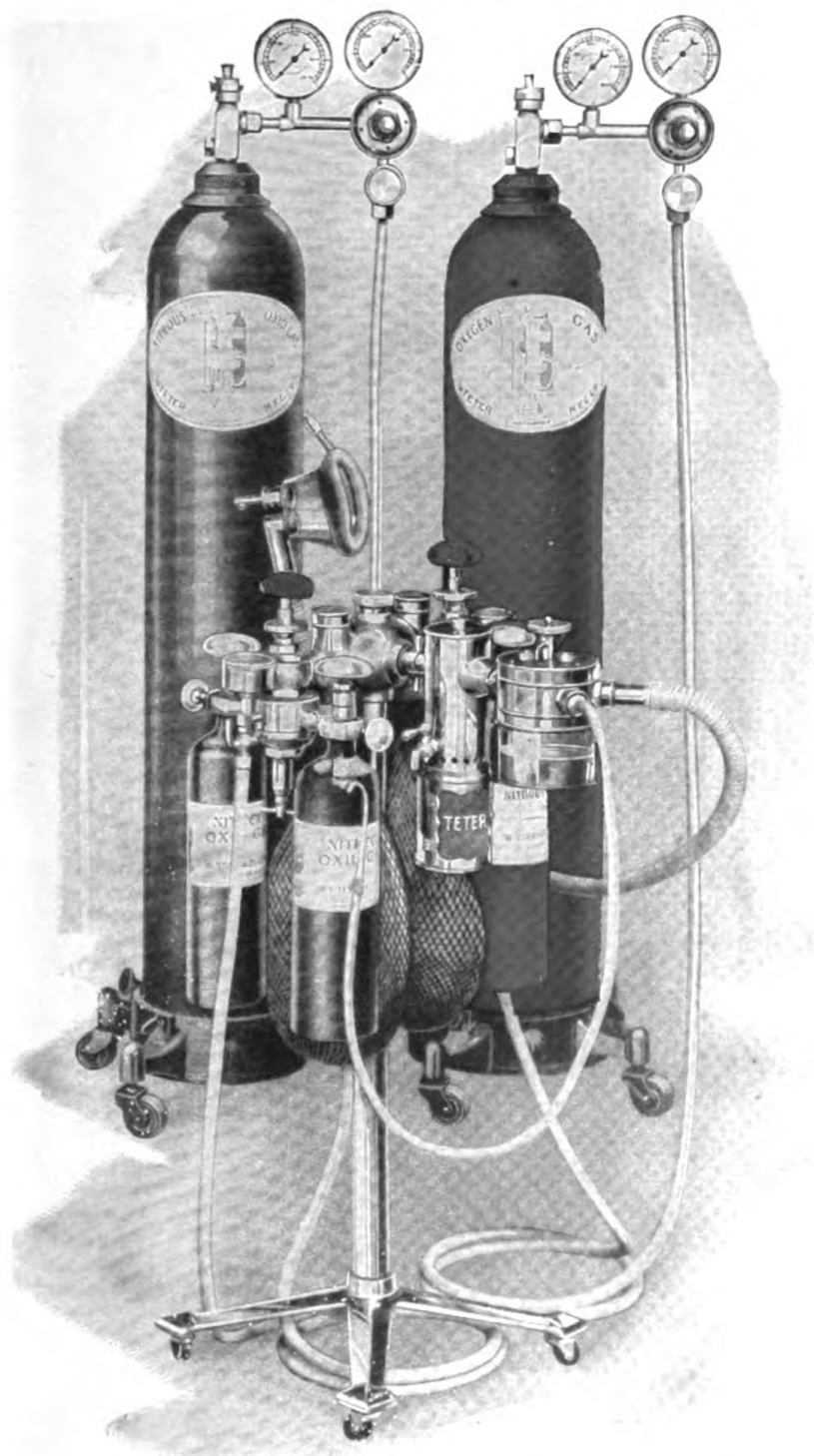


FIG. 10.—TETER'S NITROUS OXID-OXYGEN-ETHER APPARATUS.

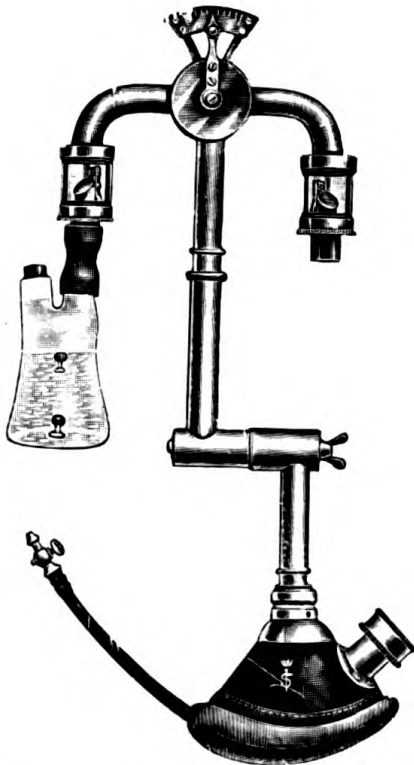


FIG. 11.—HITZ'S VAPOR BOTTLE ADAPT-ABLE FOR ANY STYLE VAPOR GAG OR THROAT TUBE.

FIG. 12.—VERNON HARCOURT'S CHLOROFORM INHALER.

FIG. 13.—DAVIS VAPOR HEATER.

FIG. 14.—GWATHMEY-FERGUSON ANESTHETIC MOUTH GAG.

Fauntleroy—Shock and Anoci-Association.

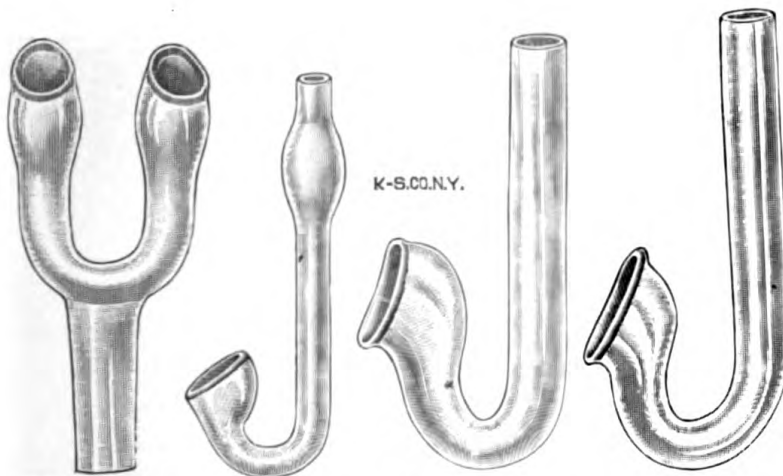


FIG. 15.—PINNEO'S APPARATUS FOR PHARYNGEAL INSUFFLATION.
FIG. 16.—LUMBARD'S ANESTHETIC NASAL TUBES.

kept in this stage as a lightening of the anesthesia may touch the vomiting center and trouble will immediately follow. It is best to be guided by the respiration, circulation, lid, and color reflex, and amount of anesthetic given."

When chloroform is administered with oxygen the narcosis is improved, and when the anesthetic is warmed there is no reduction of body temperature. Several ingenious and useful inhalers have been constructed to admit of not only giving oxygen and warmed vapor, but also nitrous oxid gas. These methods, as with ether, have proven highly satisfactory in trained hands, but the more complicated the method the more the anesthetist will have to look after and in consequence the less attention he will be able to devote to the patient's condition.

Nitrous oxid gas was first introduced as an anesthetic in 1844 by Horace Wells, a dentist of Hartford, Conn., who had one of his own teeth extracted under it without pain. It has for many years been used in this connection and also for very minor surgical work. Gradually it was discovered that the admixture of a variable amount of atmospheric air aided greatly the smoothness of administration. In 1868 the first reports of its use with oxygen were published, and from that time on it was apparent that the combination could be made use of in major work. It was not until the beginning of the present century that serious notice was taken of its usefulness and a number of apparatus were perfected to administer nitrous oxid gas with oxygen and, later on, in combination with ether or chloroform. A number of combinations and sequences of nitrous oxid and oxygen with other anesthetics have also been developed, but these additions have never been favorably received for various reasons; and although a sequence with ether or chloroform is necessary in some cases, there are some who regard the two gases, nitrous oxid and oxygen, as a general anesthetic to be used on practically all occasions.

The physiological effect of nitrous oxid gas alone on the respiratory system is that it rapidly induces asphyxia by gradual paralysis of the respiratory center in consequence of the prolonged action of the increasingly deoxygenated, or venous, blood. The fact that there is a lessened amount of tissue change in nitrous oxid anesthesia, indicated by the decreased amount of carbon dioxid given off, points significantly to its practical use in shock. Nitrous oxid is a nonirritating gas and has no injurious effect upon the mucous membrane of the lungs or alimentary tract, nor does it irritate the kidneys. It enters into loose combination with the red cells and the *liquor sanguinis* of the blood and, according to Buxton, exerts a direct action upon the heart itself, having little or no effect upon the vasomotor centers of the brain. Blood pressure is always increased with nitrous oxid alone, but with the judicious use of air or oxygen the anesthesia

may be prolonged without any appreciable change. There is convincing proof that nitrous oxid exerts a specific or selective action upon the central nervous system. In this connection, when first inhaled there is a pleasurable exhilaration, and during this time the senses of the individual are rendered more acute; this is followed by analgesia, and then by anesthesia, during which last the patient is profoundly unconscious and insensitive to pain. Hallucinations, frequently of an erotic nature, often mark the hyperesthetic stage which precedes anesthesia, and these not infrequently persist after a return to consciousness. On the muscular system it is a well established fact that nitrous oxid alone does not usually induce the relaxation necessary for certain major operations. Death from nitrous oxid alone is always due to asphyxia, and, according to Gwathmey, the heart continues to beat after respiration has ceased, which proves that death is not due to failure of circulation.

Inasmuch as it only takes from 30 seconds to one minute to reach surgical anesthesia by the use of nitrous oxid alone, the time is too short to admit of recognizing the different degrees of narcosis. Nitrous oxid, however, is very rarely given alone nowadays, but practically always in combination with air or oxygen, so that the anesthesia is prolonged, making it possible to note definite stages, just as is the case with other inhalation anesthetics.

Twenty to thirty seconds is the average duration of the first stage, which is characterized by the feeling of exhilaration, of fullness in the head, and a smothering sensation, if the percentage of nitrous oxid is too high. Objectively the respirations quicken and deepen, the pulse grows fuller, and the blood pressure rises.

The second stage, or stage of excitement, is initiated with a loss of consciousness. Incoherent words, purposeless movements, laughing, crying, and muttering are apt to occur. The respirations are more rapid and deeper than normal, while swallowing movements, sometimes with stertor, are noted. The skin now assumes the duskeness or lividity which is off and on a feature of nitrous oxid anesthesia and which is largely dependent upon the right proportion of oxygen and the care with which the administration is conducted. The patient is unconscious, but any undue roughness will markedly increase the excitement. No surgical intervention should be attempted during this stage.

The third stage, or stage of surgical anesthesia, may be induced in from one to four minutes, depending upon the individual, the purity of the nitrous oxid, the general technique, the proportion of oxygen, and other details. With perfect technique the breathing now becomes automatic, regular, and without noise, although the occurrence of stertorous or snoring breathing, with loss of rhythm, depends upon the method of administration and the preliminary medication.

The fourth stage, or stage of overdose, is ushered in with marked signs of asphyxia. The breathing becomes embarrassed, there are convulsive movements, accompanied by excessive breathing, and followed by difficult breathing. The climax is reached in violent expiratory efforts and general muscular spasm. Following this there is complete exhaustion, the pupils are more widely dilated, muscles flaccid, pulse imperceptible, respirations prolonged and sighing and gradually ceasing as a result of paralysis of the respiratory center. The recognition of the fourth stage calls for immediately turning off the nitrous oxid and substituting pure oxygen. Respiratory failure and other emergencies are met in the same manner as with other inhalations of anesthetics.

Nitrous oxid alone is never indicated in the light of our present knowledge. With modern methods, and given with oxygen, Gwathmey says that it ranks above ether or chloroform as far as safety of life is concerned, and Crile, with his associates, have had 35,000 of these anesthetics without a fatality. In prolonged operations, requiring complete muscular relaxation, ether nearly always has to be added to the combination. In very weak, debilitated subjects and in the insane it is contraindicated. It is also a very unreliable anesthetic for strong, muscular, athletic, alcoholic, and obese subjects. In ophthalmic surgery and in any condition of obstruction in the air passages, such as enlarged tonsils and adenoids, it is also contraindicated. It should not be used, as a rule, in elderly or atheromatous patients, and an already existing high blood pressure would contraindicate its use. The modern technique of heating the gas does away with all refrigeration and there is no loss of body heat. Crile and others, except in the very weak or young, always precede their anesthetics by a hypodermic of morphin gr. $\frac{1}{8}$ to $\frac{1}{4}$ and scopolamin gr. $\frac{1}{15}$ an hour before operation. One of the most complete and satisfactory apparatus yet devised was invented by Dr. C. K. Teter, of Cleveland, Ohio. There are a number of others of varying degrees of complexity to be found in different surgical centers.

The following is Dr. Teter's technique: "Fill the nitrous-oxid bag about two-thirds full; fill the oxygen bag so that it is pretty well distended and is under a little pressure. Just before placing inhaler over patient's face open the valve from the nitrous-oxid bag. Now place the inhaler in position, being sure that you have perfect coaptation to exclude all air. Start the nitrous oxid flowing from the cylinder into the bag; this should be so regulated as to keep this bag full all the time. After the patient has been breathing pure gas for about 10 or 15 seconds the oxygen valve should be opened to the second notch (which will be shown on the side of the valve cap and indicated by the ratchet), then keep increasing this one notch at a time after three or four inhalations, until you have reached the

fifth or sixth notch; do not turn this farther unless there are symptoms of asphyxia manifested. (The first manifestation of asphyxia would be blueness of the features, which would be first in the mucous membranes of the lips, in the ears, and eyelids.) If there are asphyxial symptoms present you should advance the oxygen valve still farther forward. It will be necessary to start the oxygen flowing from the oxygen cylinder into the bag after the patient has been breathing the mixture about 40 seconds in order to keep this bag well distended at all times, otherwise you would not be receiving the amount of oxygen indicated or desired. In order to keep the oxygen bag well distended the oxygen is allowed to flow very slowly from the cylinder, so slowly that one will not be able to hear it, but enough to keep the bag well distended all the time. Practice is the only sure teacher, but one is soon able to adjust this properly.

“If your patient is not going under the effects of this mixture after he has been breathing it about 40 seconds or less, he is inhaling too much oxygen, or there is an admixture of air. If the latter is the case, correct it; if the former, turn the oxygen valve back a notch or two for a few seconds, and if he still does not respond, it may be that the oxygen is flowing too fast from the cylinder; if so, correct this, and your patient should pass into a sound and peaceful sleep. Of course, you will find some few patients that are exceptionally hard to anesthetize, but by persistence all patients can be anesthetized with nitrous oxid and oxygen.

“By close observation on your part and being able to diagnose symptoms properly in order to know when to decrease or increase the amount of oxygen, you are enabled not only to induce any desired depth of narcosis, but are able to maintain it for any reasonable length of time without ever admitting one breath of atmospheric air. In fact, you will be able to obtain and maintain better anesthesia without the admittance of air. You should not cause any jactitation of the muscles, or much, if any, cyanosis in producing anesthesia. * * * Do not be in too much of a hurry in bringing your patient under the influence of any anesthetic agent, but take some little time and give the system time to accustom itself to the new order of things. You will not only get better results, but you will cause the anesthetic to be much safer by so doing.”

As regards the influence of inhalation anesthetics upon the production of shock, Crile has shown experimentally that under approximately equal trauma the changes in the brain cells were about three times as great under ether anesthesia as under nitrous oxid-oxygen anesthesia, and that the fall in the blood pressure was on the average of two and a half times greater under ether than under nitrous oxid-oxygen. As already indicated there is less tissue change under nitrous oxid-oxygen than under ether, as shown by the decreased car-

bon dioxid output in the former, and since we now recognize shock as the result of brain-cell changes, it is easy to understand the lessened production of shock under nitrous oxid-oxygen, inasmuch as it does not exert as much harmful change in the brain cells as ether. It is fairly well conceded that chloroform is more dangerous than ether as regards shock production in view of its well-known tendency toward lowering the blood pressure, which latter is the chief phenomenon of shock. Ethyl chlorid alone is out of the question as a general narcotic for prolonged anesthesia, although very useful for short periods. Whereas its combinations and sequences have been used with some satisfaction, the lack of definite percentages in the administration of the vapor is a drawback, as well as the difficulty of controlling its effects. Clinical evidence does not tend to show it to be an anesthetic of value in shock or that its use is specially indicated in any other particular condition. The A. C. E. mixture, in the usual proportion of alcohol 1, chloroform 2, and ether 3, has not found favor as an anesthetic in shock or any other depleting condition on account of the fact that in administering the drugs are not absorbed in the proportion in which they are mixed, and hence the uncertainty of effect. Many other anesthetics have been put forward from time to time but none have ever received the sanction which has been accorded the ones already discussed.

From a critical review of all obtainable data it would seem that whereas the nitrous oxid-oxygen anesthesia is the one of choice under ideal conditions, it is likewise apparent that only under very exceptional circumstances has it proven to be such. Crile and his associates have done far more than any others to bring out the advantages of this anesthetic, and they fully admit that a large factor of their success is due to their own standardization of the nitrous oxid which is manufactured by their own hospital plant, the gas being delivered through a pipe line directly to the operating pavilion. It will be seen here that the conditions are certainly ideal, since at every juncture the even purity and accurate standardization of the gas is assured. Their anesthetists are trained in the use of this gas, which never varies, and thus uniform results are always obtainable.

The next point to be considered in approaching a decision as to the inhalation anesthetic of choice is the one which has to do with always being able to obtain from the manufacturers a gas of uniform and standard purity. It is a well-known fact that the impurities which are liable to be present depend upon the materials used, proportions present, heat treatment, and the condition of the pumps and containers. It must be seen from this that the manufacture of this gas for surgical use calls for extreme accuracy in every detail if uniform results are to be obtained. Should the different plants

for the manufacture of nitrous oxid gas differ in any degree as regards the details mentioned above, it can be readily seen that their results must necessarily be different; and that this difference may vary within wide limits can be easily shown by an analysis of the different products on the market. Again, any one manufacturer, unless he takes elaborate and constant precautions to always insure a uniform product, will undoubtedly at times produce a gas not only of uncertain composition, but of varying degrees of impurity. That this latter not infrequently happens can also be easily shown by an analysis of the different containers from the same plant, which indicates that the margin of error may be considerable. This fact is also borne out at times by clinical evidence, which accounts for the conflicting reports on the use of gas from the same manufacturer.

The question next arises, can we expect uniform results to follow the use of nitrous oxid gas unless it be manufactured in a special hospital plant and under conditions which insure a standard purity? It is obvious that our answer must be in the negative, if for no other reasons than for those already given. There is, however, another factor which is not unimportant as regards obtaining uniform results, and this has to do with the anesthetist who, under ideal circumstances, is especially trained in the use of a pure and standardized gas which does not vary in its therapeutic effects. He thus becomes more accurately familiar with its anesthetic possibilities than would be the case if he occasionally and unwittingly used a gas of uncertain composition, which latter would not make for uniform results.

No one doubts the accuracy of the work and reports of Crile and his associates, but the one factor of uniform results looms large in passing judgment on the relative value of two anesthetics, such as nitrous oxid-oxygen and ether, whose merits in shock are not far from being equal. In other words, though Crile was able to demonstrate that ether caused three times more shock-producing change in brain cells than nitrous oxid-oxygen, are we warranted in arriving at the same conclusions as regards the nitrous oxid and oxygen in common use? Of course, the same may be said of ether, but errors in the manufacture of a standard liquid are far less liable to occur than in the manufacture of a standard gas, for obvious reasons, and, besides, Crile apparently used the ether which is in common use. In view of the fact that we can not hope, with the ordinary nitrous oxid and oxygen of commerce, to obtain the same ratio of efficiency as did Crile, it is reasonable to assume that, under ordinary circumstances, the difference between the two anesthetics as commonly used would be much less, and, very probably, equal, in their harmful effects upon the brain cells. In other words, if this were the only point that would enable us to choose between the two anesthetics, it would be very questionable to stamp one or the other as undoubtedly superior.

Granting that in every-day circumstances the two are practically equal as regards their harmful effects upon the brain cells, there are several other factors to be weighed before arriving at a definite conclusion as to the present inhalation anesthetic of choice. Some of these factors are in favor of nitrous oxid-oxygen and some are in favor of ether.

There can be no doubt that it requires much more skill and experience to administer nitrous oxid-oxygen than it does to administer ether, and unless one is especially trained in the use of nitrous oxid-oxygen it may prove to be not only unsatisfactory but highly dangerous. As against this, it has always been an argument in favor of ether that it was the safest anesthetic in unskilled hands, and for the reason that the margin of safety was apparently much broader and more constant than with other anesthetics. The apparatus for administering nitrous oxid-oxygen is of rather a complicated character and this certainly can not be put down as a point in its favor. The bulk and weight of the apparatus have, so far, practically restricted its use to the hospital and thereby curtailed its usefulness as regards the large amount of outside surgical work. The simplicity of giving ether by the open or closed method is certainly a recommendation in its favor, and the fact that one or the other method admits of practically universal application is another point to be noted in favor of ether.

There can be no doubt that ether is a much more irritating gas than the nitrous oxid-oxygen combination. This is manifest principally in the mucous membranes of the respiratory and digestive tracts, giving rise to certain disagreeable, and therefore harmful, effects both during and after operation. The modern technique in the administration of ether has for some time called for a few drops of an alcoholic solution of bitter orange peel on the mask as a preliminary to ether, and this in the vast majority of instances, does away with the disagreeable irritant effects as noticed by the patient. It also admits of a much more tranquil administration of ether, thereby lessening the amount used and rendering its other irritant effects practically negligible. As already pointed out, it is claimed by many that ether, cautiously administered, has not only not irritated or caused harm in respiratory diseases but that it has often exerted a beneficial effect.

As regards the physiological effects on the circulation, with the exception of the blood pressure as noted by Crile, the two anesthetics are practically equal. That the blood pressure in all cases, except in actual drug poisoning, is inseparably connected with brain-cell fatigue no one can doubt; and, other things being equal, if the two have practically the same effects on the brain cells under ordinary circumstances, it is fair to assume that the blood-pressure effects of

the two narcotics are practically the same. In regard to the kidneys it would seem that there is fairly good ground for attributing a certain amount of harm arising from the administration of ether in cases where these organs are seriously damaged. On the other hand, there are many who claim that, although somewhat irritating, it causes no more actual harm than any other general anesthetic.

The refrigerating effect of the drop method of administering ether was early recognized and led to the development of closed and rebreathing methods to obviate the loss of bodily heat in prolonged operations. The advocates of the open or drop method met this objection by partially inclosing the mask with a moist towel, as given in Davis's technique, causing a certain amount of rebreathing, which warms up the ether vapor and thereby does not cause an excessive amount of refrigeration. According to Gwathmey, the Mayo brothers, of Rochester, Minn., have probably used the drop method of giving ether for a longer period of time and a larger number of administrations than any other surgeons. They have given it over 20,000 times without a fatality. In many other large clinics, both at home and abroad, it has found general acceptance, and it would seem to indicate that it is the method of choice, as regards giving ether, with a large number of experienced surgeons. While statistics in different parts of the world vary and are oftentimes misleading, Rovsing, who has had a long and distinguished surgical experience, states that after a careful analysis of all reported ether deaths, only 1 death in 56,000 could be attributed directly to ether.

The possible aftereffects of ether narcosis, in contrast to the aftereffects of nitrous oxid-oxygen, would seem to indicate a favorable showing for the latter, although this is largely dependent upon the patient's general condition at the time of operation. Gwathmey makes the following statement: "It has been stated that if ether is administered according to modern methods, with the utilization of preliminary and accompanying factors, the subject emerges, as a rule, from the anesthetic state as if from normal sleep, feeling no ill effects as far as the anesthetic is concerned. Under other circumstances, however, even with the most careful technique, the recovery period may be marked by retching, nausea, and vomiting." Idiosyncrasies and untoward effects have also been noted in connection with nitrous oxid-oxygen, and there are no accurate data to show which of the two anesthetics is more responsible for occasional bad after effects. There can be no doubt that when the anoci-association principle is applied it will reduce the number of these occurrences in ether anesthesia as it has done in the case of nitrous oxid-oxygen.

In regard to post-operative pneumonias, Mikulicz, quoted by Rovsing, shows that this occurrence is no more common under ether than under any other anesthetic. In view of the fact that it was ex-

tremely rare to find pneumonia following operations on the extremities, thorax, and head, it was argued that it was always due to two circumstances: (1) That peritoneal infection is conveyed to the lungs partly by way of the lymph vessels and venous blood, and partly by embolism; and (2) that a patient with a laparotomy wound dares not cough or breathe freely, inasmuch as this involves pain in the wound. If, therefore, there is a previous bronchitis, or if an infection of the lung sets in, the development of pneumonia is favored by the deficiency in expectoration and lung ventilation. There can be no doubt that nitrous oxid-oxygen causes venous congestion to be more apparent than does ether, and so much so that it is usually a serious hindrance in head and neck work. In atheroma, aneurisms, and other conditions where the blood vessels are diseased there is practically no difference in the effect of the two drugs. In diabetes, if any inhalation anesthetic is to be given, nitrous oxid-oxygen is to be preferred, although a local anesthetic would be less harmful than any respiratory narcotic.

In summing up, it would seem that except in the very unusual ideal circumstances which obtain in the hospital service of Crile and his associates there are no factors which can be seriously considered as pointing to the general superiority of nitrous oxid-oxygen over ether in the choice of an inhalation anesthetic. In view of the foregoing, and in view of the great ease and simplicity of administering ether, its great utility and the vastly larger number of trained anesthetists, it would seem that ether, by the open or drop method, is undoubtedly the present inhalation anesthetic of choice. It is not to be understood that when opportunity arises the surgeon is to neglect the use of some other anesthetic which could be preferred to ether in a particular case, but, as the patient's interests are always paramount, that anesthetic or technique is to be used which will do most to insure safety and success.

Dr. Crile, in Murphy's Clinics of February, 1914, makes the following statement: "Nitrous oxid skillfully given, in my estimation, is the best anesthetic for surgical purposes, but it ought never to be given except by some one who has been well trained in its administration. In my judgment, the degree of M. D. does not qualify any man to give nitrous-oxid anesthesia, or any anesthetic, in fact. It gives anyone a legal qualification, but it does not give one a moral qualification. It takes a special training to give nitrous oxid, for it is the most difficult of all anesthetics to give well.

"Now, gentlemen, I am speaking about this because I have known of certain fatalities from nitrous oxid anesthesia administered by inexperienced anesthetists. I believe that when well given it is the safest anesthesia one can use, and I think that nitrous oxid not well

given is perhaps the most dangerous anesthetic there is. Now, in my own clinic in the Lakeside Hospital we have given nitrous oxid for general surgical purposes 8,000 times. I myself spent a great deal of time some years ago in working out the nitrous-oxid problem in my laboratory. I watched the progress of this anesthetic, and I took especial pains to train our first anesthetist, who in turn now trains others. It takes six months for a good training in nitrous-oxid administration. I would not for one moment consider myself competent to give nitrous oxid to any patient, for I believe that it requires a particular training of the reflexes to give this anesthetic well."

THE PROPOSED PERSONNEL, ORGANIZATION, AND EQUIPMENT OF A HOSPITAL SHIP.

(Based on the plans prepared under the direction of the Surgeon General, approved by the General Board, and published in the Naval Medical Bulletin of July, 1914.¹)

By E. M. BLACKWELL, Surgeon, United States Navy, and O. G. RUGE, Chief Pharmacist, United States Navy.

Hospital ships of the Navy, being assimilated to naval hospitals on shore, should, as far as practicable, be conducted along similar lines. Conditions aboard ship, however, differ greatly from those in hospitals on shore, and hence the detail, routine management, and conduct of affairs aboard will differ considerably from those ashore. As few medical officers of the Navy have the opportunity of serving on hospital ships, this article is written with the earnest desire that it may be of some use, and in a measure act as a guide, to those who without previous experience may be called upon to organize the personnel and equip a hospital ship or medical transport in time of war or other emergency. Conditions as to personnel, organization, and equipment will vary greatly with different classes of ships; but with a general outline as to what should obtain aboard a hospital ship it should not be difficult to adjust these matters to the conditions that may be found. As conditions may arise at any time which may call for the outfitting of a number of hospital ships or medical transports on short notice, it behooves the Medical Department of the Navy to be prepared with some definite plan of action for such an emergency, and it is hoped that the outline submitted here may be of some value.

¹ The writers are indebted to Medical Director E. R. Stitt, Surg. E. J. Grow, Surg. R. C. Holcomb, Surg. A. M. Fauntleroy, Passed Asst. Surg. G. F. Clark, Pharmacist Stephen Wierzbicki, and Hospital Steward Gall, U. S. Navy, for valuable assistance in making up the proposed equipment in their special branches.

Hospital ships of the Navy are commanded by medical officers not below the grade of surgeon. The officers and crew are divided into two classes, one consisting of the naval complement, composed of medical officers, members of the Hospital Corps, and such pay officers and assistants as the department may designate; the other consisting of the naval auxiliary service complement, composed of such officers and men of that service as may be necessary in the navigation and upkeep of the ship, running the engines and machinery, and doing the cooking and mess service of the vessel.

The hospital ship, then, has two separate and distinct departments, viz: (a) The medical department, upon which devolves the care and treatment of the sick and wounded, under the direct charge of the executive surgeon; (b) the naval auxiliary service, which has charge of everything in connection with the navigation of the ship, under the direct charge of the master. Both of them are under the command of, and are subject to, the orders of the commanding officer. The executive surgeon and the master are the executive officers of the ship, and each of them is directly responsible for the management and conduct of his department to the commanding officer.

The executive surgeon has charge of all those parts of the ship assigned to the medical department, and all orders issued by him are by the authority of the commanding officer. He has charge of the junior medical officers, members of the Hospital Corps, all patients and others attached to the medical department of the ship, and is directly responsible to the commanding officer for the management and discipline of the personnel, the care and treatment of the patients, and the conduct of all other affairs of his department, and should consult with him frequently in regard to matters pertaining to the medical department.

The master has charge of all those parts of the ship not assigned to the medical department, and is responsible for the navigation, safety, and upkeep of the ship in general. All orders as to the movements, disposition, and work of the ship must come from or through the commanding officer; but he can not interfere in the carrying out of any orders or work that comes within the technical purview of the master in the performance of his duties. The officers and men of the Naval Auxiliary Service are under the control of, are paid, detailed, and disciplined by the master, and all orders to them must be given by or through him. He has the same authority over his officers and men as pertains to masters of the merchant service.

In any organization composed of two separate and distinct classes of men under different authority it is very difficult to prevent clashes of authority between the two. On hospital ships, outside of the authority of the commanding officer over the master, the naval comple-

ment has no authority over the auxiliary complement except such as may be delegated to it by the master in special cases, such as the detail of men of the commissary branch for duty in the cabin and wardroom pantries and galleys, and men for working parties under an officer or member of the Hospital Corps; nor has the auxiliary complement any authority over the naval complement except such as may be delegated to it by the commanding officer in special cases, such as hospital apprentices detailed for signalmen on the bridge, and men for working parties. Were the regulation forbidding orders to be issued from one service to the other except through the commanding officer or master strictly enforced, it would cause no little inconvenience and trouble in carrying on the work of the ship and in maintaining order and discipline. It is generally understood that officers of either service may give orders to men of the other service in cases of emergency or necessity, or to expedite business, and that the master at arms and boatswain may quell disturbances and establish order in any portion of the ship at any time. An understanding of this kind, and a spirit of give and take between the two services, goes a long way toward promoting discipline, order, efficiency, and good fellowship.

THE MEDICAL DEPARTMENT.

In the organization and detail of the personnel of the medical department of a hospital ship a greater number of men will be required in the Hospital Corps, in proportion to the number of patients, than in a hospital on shore. This is due to the fact that there are many special details on a hospital ship that do not obtain in a hospital, and many of the duties performed by civil employees at a hospital must be performed by the Hospital Corps aboard ship. The number required will be greater in proportion to the number of patients on small ships than on large ships. Thus on a ship of 250 or 300 beds the proportion would be about one hospital corpsman to about 4 patients, and on ships of 500 to 600 beds the proportion would be about 1 to 5 or 6.

For convenience of organization and detail the personnel of the medical department of the ship should be divided into four divisions in accordance with the character of the duties to be performed, and each division divided into different sections in accordance with their stations and the character of the work. The divisions of the personnel should be as follows:

The first, or administrative, division is in charge of the executive surgeon and includes the pharmacist and members of the Hospital Corps not detailed to wards or other duties pertaining to the direct care and treatment of the sick.

The second, or surgical, division is in charge of the operating surgeon and includes two other medical and one dental officer as assistants in the division and members of the Hospital Corps detailed for the sick officers' quarters and surgical wards, operating and X-ray rooms, eye, ear, nose, and throat room, and dental office.

The third, or medical, division is in charge of a surgeon and includes two other medical officers as assistants in the division and members of the Hospital Corps detailed for the medical, venereal, and isolation wards, laboratory and autopsy rooms, and for night duty.

The fourth, or commissary, division is in charge of a pay officer of the Navy and includes such assistants as may be detailed by the Navy Department to carry on the work.

The detail of the junior medical officers to the various divisions and duties is made by the commanding officer, while the detail of the Hospital Corps to the various divisions and duties is made by the executive surgeon with the approval of the commanding officer.

The personnel of the naval complement of a ship the size of the one proposed should be about 100, consisting of 8 medical officers, including the commanding officer, 1 pay officer, 1 dental officer, and 1 pharmacist, 88 members of the Hospital Corps, and 4 men for the commissary division. This complement would be sufficient if the ship were moderately filled with from 400 to 500 patients, but would not be sufficient if it were filled to its capacity of about 600 patients, in which case the Hospital Corps would have to be increased from 10 to 15 per cent. On the other hand, if there were only from 200 to 300 patients aboard, the Hospital Corps could be decreased from 10 to 15 per cent.

For purposes of detail, duty, relief, liberty, stations, and drills the Hospital Corps is divided into two watches, the starboard and the port. Every man is assigned a ship number which indicates his watch and division and is the number of his station, bag, hammock, berth, ditty-box, and clothes locker. The first figure of the ship number indicates the number of the division and the last figure indicates the watch, the starboard watch being given odd numbers and the port watch even numbers. His number in the division is the number after the first figure. Thus the ship number 231 indicates that the man belongs to the second division and the starboard watch, his number in the division being 31.

In assigning stations for duty, fire, collision, and abandon-ship drills a man should be located, when practicable, on the side of the ship corresponding with his watch. In addition to his regular duties in the medical department every man should have a regular station by number at fire, collision, and abandon-ship drills, and should know the name, number, and location of his boat. Every

man on coming aboard should be given a card with his name in full, rate, and ship number, which he should keep in his ditty-box or locker.

For purposes of fire, collision and abandon-ship drills every patient should be given a ship number indicating his division in the same manner as the members of the Hospital Corps. In the sick quarters and wards for officers every room and berth should have a number which should be assigned to the officer occupying that room or berth. In the other wards every berth should have a number and each locker should have a number corresponding to the number of a berth. Each patient is assigned a berth and locker and the number thereon upon coming aboard. The bag and hammock rooms should have the bag and hammock racks numbered the same as the berths and lockers, and each patient's bag and hammock should be stored in a rack of the same number as his berth and locker. The number, name, and location of the boat to which a patient is assigned at abandon ship should be placed below his number on his berth.

In fire, collision, and abandon-ship drills the medical department and the auxiliary service have to act in conjunction, and the master has general direction and supervision during the drills; he and the executive surgeon reporting their respective departments to the commanding officer.

The station bill is made out by the master and the executive surgeon acting in conjunction, each one detailing the personnel of his department for the various stations and duties. At drills the officers of the naval complement muster their divisions, see that the men are at their stations and duties or accounted for, and report to the executive surgeon, who reports to the commanding officer. The auxiliary officers muster their divisions, see that they are at their stations and duties, or accounted for, and report to the master, who reports to the commanding officer.

The station bill should give a complete list of officers, naval by letter and auxiliary by title, with their station and duties, and all the men of the naval and auxiliary complements and patients by number, with their stations and duties. This bill should be posted in conspicuous places, and the division officers should see that their men are familiar with their stations and duties. It is not possible to make out a station bill until one is actually aboard ship and is familiar with the location and the personnel.

In addition to the station bill for fire, collision, and abandon-ship drills each department makes out a separate detail of its personnel for the various divisions, stations, and duties in that department.

The personnel of the naval complement should be as follows:

OFFICERS.

- 1 Medical inspector or surgeon as commanding officer.
- 1 Surgeon as executive surgeon.
- 2 Surgeons as heads of divisions.
- 2 Passed assistant surgeons as first assistants in divisions.
- 2 Assistant surgeons as second assistants in divisions.
- 1 Assistant dental surgeon.
- 1 Pharmacist.
- 1 Pay officer.

11

HOSPITAL CORPS.

- 8 Hospital stewards.
- 42 Hospital apprentices, first class.
- 38 Hospital apprentices.

88

COMMISSARY FORCE.

- 1 Chief yeoman.
- 1 Commissary steward.
- 2 Yeomen, second class.

4

This gives a total complement of 103.

The detail of the personnel of the naval complement should be as follows:

(A) COMMANDING OFFICER.

FIRST DIVISION (administrative).

OFFICERS.

(B) Executive surgeon (in charge).

(J) Pharmacist.

HOSPITAL CORPS.

	Star-board watch No.	Port watch No.
1. Executive office:		
Pharmacist in charge—		
Hospital steward	11	
Hospital apprentice, first class		12
2. Disciplinary section:		
Hospital steward (master at arms)		14
Hospital apprentice, first class (assistant)	13	
Hospital apprentice (bag and disinfecting rooms)	15	16
3. Dispensary and storerooms:		
Pharmacist in charge—		
Hospital steward		18
Hospital apprentice, first class	17	120
4. Post office:		
Hospital apprentice, first class (mail clerk)	19	

	Star- board watch No.	Port watch No.
5. Messmen (Hospital Corps) :		
Hospital apprentice	121	122
Hospital apprentice	123	124
Hospital apprentice	125	126
6. Convalescent mess :		
Hospital apprentice, first class		128
Hospital apprentice	127	
7. Commanding officer's orderlies :		
Hospital apprentice	131	130
8. Signalmen :		
Hospital apprentice	133	132
Hospital apprentice	135	134
Total	12	12

SECOND DIVISION (Surgical).

OFFICERS.

- (C) Operating surgeon (in charge).
 (D) Medical officer, first assistant.
 (E) Medical officer, second assistant.
 (F) Assistant dental surgeon.

HOSPITAL CORPS.

	Star- board watch No.	Port watch No.
1. Operating and X-ray rooms :		
Hospital steward	21	22
Hospital apprentice, first class	23	24
Hospital apprentice, first class	25	
Hospital apprentice	29	26
Hospital apprentice		28
2. Surgical wards :		
Hospital steward (in general charge)		210
No. 1. Officers—		
Hospital apprentice, first class	211	212
Hospital apprentice	213	214
No. 2. Junior officers—		
Hospital apprentice, first class	215	216
Hospital apprentice	217	218
No. 3. Warrant officers—		
Hospital apprentice, first class	221	220
Hospital apprentice	223	222
Nos. 4 and 5. Forward, port—		
Hospital apprentice, first class	231	230
Hospital apprentice, first class	233	232
Hospital apprentice, first class	235	234
Hospital apprentice	241	240
Hospital apprentice	243	242
Nos. 6 and 7. After, port—		
Hospital apprentice, first class	251	250
Hospital apprentice	257	256
Total	17	18

THIRD DIVISION (Medical).

OFFICERS.

- (G) Medical officer (in charge).
 (H) Medical officer, first assistant.
 (I) Medical officer, second assistant.

HOSPITAL CORPS.

	Star- board watch No.	Port watch No.
1. Laboratory:		
Hospital steward-----		32
Hospital apprentice, first class-----	31	
2. Night hospital apprentices:		
Hospital apprentice, first class-----	35	36
3. Medical wards:		
Nos. 8 and 9. Forward, starboard—		
Hospital apprentice, first class-----	311	310
Hospital apprentice, first class-----	313	312
Hospital apprentice, first class-----	315	314
Hospital apprentice-----	321	320
Hospital apprentice-----	322	321
No. 10 and 11. After, starboard—		
Hospital apprentice, first class-----	331	330
Hospital apprentice-----	337	336
No. 12. Isolation—		
Hospital apprentice, first class-----	341	340
Hospital apprentice, first class-----	343	342
Hospital apprentice-----	347	346
No. 13. Venereal—		
Hospital apprentice, first class-----	351	350
Hospital apprentice-----	357	356
Total-----	14	14

FOURTH DIVISION (Commissary).

(K) Pay officer (in charge).

	Star- board watch No.	Port watch No.
Chief yeoman (pay officer)-----	41	
Commissary steward (commissary)-----		42
Yeoman, second class-----	43	44

In addition to this general detail there will have to be many special details made out to carry on the work and duties aboard. The details in the wards will generally be made out by the division officers with the approval of the executive surgeon. In the above detail it might appear that some of the members of the Hospital Corps would not have sufficient duties to occupy their time, but there will be many special duties outside of their regular stations to which they can be assigned. In this detail every man has a relief in the opposite watch, and when one is not indicated, a relief should be specially detailed.

There will be no necessity for increasing or decreasing the Hospital Corps anywhere aboard the ship except in the wards. When the wards are filled to capacity an increase in the hospital apprentices will probably be necessary, and vacancies in the numbers assigned have been left for this purpose. When there are few patients in the wards the number of hospital apprentices can be decreased. When necessary the division officers may, with the approval of the executive surgeon, shift apprentices temporarily from one ward to another should work be heavy in one ward and light in another. The after wards on the second, or ward deck, being used chiefly for convalescents, will not require nearly so many hospital apprentices as the forward wards where the active and acute cases will be cared for and treated.

In the executive office the pharmacist will have general charge of all the records and correspondence of the medical department of the ship, and he will be assisted by a hospital steward and a hospital apprentice, first class. All work done in the executive office must be viséd by the executive surgeon before final action upon it by the commanding officer.

The disciplinary section comes directly under the executive surgeon, and there is a hospital steward detailed as master-at-arms and three hospital apprentices, first class, one as assistant, one as bag-room keeper, and one in charge of the disinfecting rooms. It will be the duty of the master-at-arms and his assistants to maintain order and look after the cleanliness of the medical department. He has charge of the Hospital Corps' quarters, mess and toilets, the recreation rooms, convalescent mess room, strong rooms for the insane, ship's prisons, bag and hammock rooms, sterilizing rooms, passage ways, and other spaces of the medical department not specially allotted.

The storerooms, dispensary, and all the stores and supplies of the medical department are in charge of the pharmacist. He has a hospital steward and two hospital apprentices, first class, as assistants, who are responsible for the issue of medicines and supplies and handling of the stores. One hospital apprentice, first class, looks out for the linen room and does all the mending and repairing of the hospital linen.

The messmen serve the meals and keep the quarters and toilets of the Hospital Corps clean. They do the dish washing in the scullery for patients and Hospital Corps. In the convalescent mess the hospital corpsmen on duty there superintend the serving of the meals by convalescent patients detailed for that duty, and keep the compartment clean.

Two hospital apprentices are detailed as orderlies for the commanding officer, and four hospital apprentices as signalmen under the master for duty on the bridge.

In the second, or surgical, division the operating and X-ray rooms include the main operating room, small operating room, sterilizing room, eye, ear, nose, and throat room, dental office, X-ray room, photographic and dark rooms. There are detailed for these rooms two hospital stewards—one for the main operating and X-ray rooms and one for the dental office; three hospital apprentices, first class—one in the main operating room and X-ray room, one in the small operating room, and one in the eye, ear, nose, and throat room; and three hospital apprentices for general work and cleaning up these compartments. In the three sets of quarters for sick officers and four wards of this division there are detailed 14 hospital apprentices, first class, and 12 hospital apprentices for duty in nursing and caring for the patients and keeping the compartments clean and in order. There are rooms for 30 officers and berths for 178 men, or a total of 208 patients in this division. The hospital apprentices can be temporarily shifted from one ward to another as occasion may require.

In the third, or medical, division the hospital steward and hospital apprentice, first class, in the laboratory will attend to the autopsy room and the laboratory animals. In the four wards on the second deck, the isolation and venereal wards, there are detailed 14 hospital apprentices, first class, and 10 hospital apprentices for duty in nursing and caring for the patients and keeping the compartments clean and in order. In this division there are berths for 174 patients in the wards on the second deck, 52 in the venereal ward, and 68 in the isolation wards, or 294 patients in all. In these wards, as in the surgical wards, hospital apprentices can be shifted temporarily from one ward to another, as occasion may require. The night hospital apprentices are assigned to this division for convenience of detail, but might with propriety be assigned to the first division, as they will be available for night duty in all the wards and will make periodical inspections of the compartments of the medical department of the ship. In addition to the regular night hospital apprentices, other members of the Hospital Corps will be detailed by the executive surgeon for night duty with patients in the various wards, as occasion may require.

In the fourth, or commissary, division, under the pay officer, the chief yeoman and a second-class yeoman will attend to the clerical work, while the commissary steward, assisted by a second-class yeoman, will have charge of the commissary storerooms and the procuring, storing, issuing, and preparation of the food for the Hospital Corps, patients, and auxiliary crew. The pay officer has charge of the ship's galleys and the commissary force of the auxiliary service

employed therein. The food is prepared, cooked, and delivered to the pantries, where it is taken charge of by the pharmacist for the patients and Hospital Corps and by an officer detailed by the master for the auxiliary crew. It is served to the various messes by the messmen detailed for that duty. The pay officer also has charge of the canteen, and a yeoman should be detailed for that duty.

THE NAVAL AUXILIARY SERVICE.

The complement of the personnel of this department is established in its various branches by the supervisor of the Naval Auxiliary Service, and the detail to its various duties is made by the master or first officer and chief engineer. The complement is divided into three branches, viz: (1) Seaman branch; (2) engineer force; and (3) commissary branch. It should be much larger in proportion on a hospital ship than on other auxiliaries of the same tonnage on account of the large number of patients that will be aboard; the larger amount of auxiliary machinery; sanitary plumbing and arrangements to be cared for and kept in repair; the extra work entailed by the necessity of greater sanitary precautions; to man and handle the numerous running boats, and to provide sufficient seamen for the various boats at abandon ship.

The proposed auxiliary complement for this ship as furnished by the supervisor of naval auxiliaries upon the request of the Bureau of Medicine and Surgery is as follows:

OFFICERS.

Master.....	1	Third assistant engineer.....	2
First officer.....	1	Electrician (radio).....	2
Second officer.....	1	Electrician (general).....	1
Third officer.....	2	Clerk.....	1
Chief engineer.....	1		
First assistant engineer.....	1	Total.....	14
Second assistant engineer.....	1		

SEAMAN BRANCH.

Boatswain.....	1	Seaman.....	22
Carpenter.....	2		
Quartermaster.....	5	Total.....	30

ENGINEER FORCE.

Water tender.....	3	Coal passer.....	12
Oiler.....	9		
Plumber.....	1	Total.....	37
Fireman.....	12		

COMMISSARY BRANCH.

Chief steward.....	1	Cabin boy	6
Steward.....	3	Cabin boy (laundry).....	3
First cook.....	4		
Second cook.....	4	Total.....	27
Messman.....	6		
OFFICERS.....			14
SEAMAN BRANCH.....			30
ENGINEER FORCE.....			37
COMMISSARY BRANCH.....			27
Total.....			108

This complement is based upon the present complement of the hospital ship *Solace*, which is a much smaller ship, and has about one-third the bed capacity for patients, yet its complement is only 14 less than that of the proposed ship. The present complement of the *Solace* would hardly be sufficient to perform all the duties of the ship efficiently were it filled to near its capacity of 230 patients, as an increase of patients causes an increase of work for the auxiliary complement, although not in the same proportion as for the Hospital Corps. The complement given above would probably be sufficient for the proposed ship under ordinary conditions, but probably not if all the 506 beds were filled, and certainly not if the ship were filled to its full capacity of 666 patients.

The estimate of the necessary auxiliary complement submitted by the Bureau of Medicine and Surgery to the supervisor for consideration was only 124, or 16 more than the above complement of 108, and only 30 more than that of the *Solace*, which is a much smaller ship, with about one-third the bed capacity for patients. This is not a large increase, yet it would add greatly to the efficiency of the ship. There is a difference of 10 in the two estimates for the seaman branch, and this reduction will make it very difficult for that branch to do the work on deck, handle the ship and boats, and keep things shipshape, clean, and sanitary. There is a difference of only three in the estimates for the engineer force, which discrepancy is possibly negligible. As the ship is to be an oil burner, the bureau made no estimate for coal passers, but increased the estimate for machinists, plumbers and fitters, oilers, and firemen instead. In the commissary force there is a difference of four in the estimates for cooks and bakers, and this discrepancy would be a considerable handicap with the ship full of patients.

No tentative detail of the auxiliary complement will be attempted here, as that is a matter that rests entirely with the master. A certain number of the commissary force are detailed by the master for duty in the cabin, wardroom, galleys, and pantries, and their sta-

tions and duties are assigned to them by the commanding officer, executive surgeon, and pay officer. These men are subject to the orders of officers of the naval complement only in so far as these orders relate to the duties to which they are assigned.

EQUIPMENT.

The equipment of a hospital ship should be made not only with a view to its own needs, but it should carry large quantities of reserve stores in order to supply ships of the fleet in emergencies. In addition to these reserve medical stores there should be on board a brigade medical outfit, including 40 company equipments, 4 regimental equipments, and 1 brigade hospital equipment. This brigade medical outfit is to be kept intact and used only with a large landing force. Small landing parties may be provided with the expeditionary cases, medical and surgical. Two company units with complete mess equipments and extra supplies of disinfectants and mosquito bars, for the establishment on shore of contagious or detention camps, should also be kept on board. In this connection it may be mentioned that the field hospital and regimental outfits, contents of which are enumerated in the addenda of the present supply table, have been found inadequate and are now undergoing revision with a view of meeting requirements as recently experienced in actual service. This experience, gained by medical officers in the operations on shore at Vera Cruz, will prove valuable in the revision of these outfits, and we may look for great improvement when this work has been completed.

Abundant supplies of surgical dressings, such as absorbent gauze, cotton, muslin, adhesive plaster, splints, and bandages are very necessary. Roughly stated, and with certain modifications, the articles enumerated under the class "Surgical dressing" of the supply table should be provided in quantities of about 25 times a battleship's allowance. The medical stores for outfitting the ship listed on Form B (other than surgical dressings and surgical instruments) should approximate 10 times a battleship's allowance. The bedding required and to be supplied with other stores of the outfit on Form B is given in detail farther on.

The medical stores and surplus equipment for use of the ship should be unpacked and arranged systematically in the medical storerooms, while the reserve supplies should be kept in the original packages and placed in the reserve medical storerooms and held for issue when necessary.

While the ship should carry large supplies of stores for issue it is not intended that it be used as a supply depot, but that it will be called upon for supplies to replenish exhausted stock in emergen-

cies only. It might at times become necessary or advisable for the hospital ship to transport and distribute medical supplies from a supply depot to various ships of the fleet, or to foreign stations, but this would occur under extraordinary circumstances only and not as a routine duty.

In making up the estimates for the equipment of the ship for articles other than those mentioned above, it is not intended to give in detail the equipment of each ward, room, or compartment, but to give a general statement of the furniture and apparatus that should obtain in them, and the total amount of such equipment. Cots, lockers, tables, chairs, etc., usually provided as a part of the ship by the Bureau of Construction and Repair will not be considered.

Each officers' ward will be provided with a combination medicine cabinet and nurses' desk, and the respective toilet with a small sanitary rack.

The large surgical and medical wards will each have one ward medicine and drug cabinet, one ward desk, one dressing stand, one dressing table, one large sanitary rack, one small instrument sterilizer, one utensil sterilizer, and one stand for quiet room. The venereal ward will have a similar equipment, with the addition of 2 g. u. irrigating chairs. The other medical and surgical wards and the convalescent wards will each have a ward medicine and drug cabinet and ward desk, and where there is a separate toilet a large sanitary rack.

Each isolation ward will have one ward desk and one small sanitary rack, while for the joint use by these wards will be provided one small instrument sterilizer, one utensil sterilizer, and a small disinfecting compartment.

The total of the above is as follows:

3 combination medicine cabinets and nurses' desks.	4 instrument sterilizers.
9 ward medicine and drug cabinets.	4 utensil sterilizers.
15 ward desks.	5 large sanitary racks.
3 dressing stands.	9 small sanitary racks.
3 dressing tables.	2 g. u. irrigating chairs.
	2 stands for quiet room.

The main operating room will be equipped with two complete operating tables and accessories. The equipment in this room will comprise:

2 shelf stands.	2 immersion stands, two-bowl.
2 operating tables.	2 bowl stands, revolving.
1 surgical-instrument cabinet, Navy standard.	2 irrigating stands, with hooks.
1 instrument cabinet, large.	1 container stand.
2 instrument tables.	2 operating stools.
	2 footstools.

In addition to the instruments in the surgical-instrument cabinet, as enumerated in the supply table, the following instruments and appliances should be provided:

- | | |
|---|---|
| 1 apparatus, breathing, Swedish. | 2 forceps, dressing, Bozeman. |
| 1 apparatus, infusion, Kelly. | 4 forceps, dressing, Cheron. |
| 1 apparatus, nitrous oxid-oxygen-ether inhaler, complete. | 2 forceps, Ferguson. |
| 2 aspirators, Schmidt. | 2 forceps, hemorr., Earl. |
| 1 aspirator needle. | 2 forceps, hysterectomy, Pean, 10-inch. |
| 1 bag, rubber, for Bennett inhaler, set. | 36 forceps, hemorr., Halstead. |
| 3 basins, solution, deep form, 14-inch d. | 36 forceps, hemorr., Keen. |
| 8 bistouries, assorted. | 12 forceps, hemorr., Pean, 6½-inch. |
| 12 bone plates, Sherman. | 2 forceps, intestinal, Barrett. |
| 48 bone plate screws. | 2 forceps, intestinal, Brunner. |
| 1 bone plate driver. | 2 forceps, Doyen. |
| 1 bone plate holder. | 2 forceps, intestinal, Gussenbauer. |
| 2 bottles, aspirating, 1,000 cubic centimeters. | 2 forceps, intestinal, Mayo. |
| 4 buttons, Murphy, oval. | 2 forceps, intestinal, Mikulicz. |
| 1 cabinet, surgical, instrument, Navy standard. | 2 forceps, marginal, Smith. |
| 1 canula, blood infusion, Elsberg. | 12 forceps, mosquito, Halstead. |
| 1 canula, saline, infusion. | 2 forceps, Murphy-Barrett. |
| 1 carrier, ligature, Cleveland, improved. | 6 forceps, needle, Richter. |
| 2 carriers for Gigli saw. | 2 forceps, prostatic, lobe, Young. |
| 3 chisels, Bruns. | 1 forceps, splinter, Little. |
| 2 clamps, hemorr., Linn. | 6 forceps, thumb, plain. |
| 1 clamp, intestinal, 3-blade, Gidney-Walker. | 2 forceps, tissue, Stone. |
| 6 connections, glass, thermometer inside. | 6 forceps, tissue, Kelly-Halstead, 6-inch. |
| 1 costotome, chisel. | 1 forceps, tongue, Collins. |
| 2 curettes, mastoid, Buck. | 1 forceps, tongue, Mathieu. |
| 6 curettes, Volkmann. | 4 forceps, towel, Doyen. |
| 2 cushions, Edebohl. | 2 forceps, viscera, Eastman, 9½-inch. |
| 1 cranial instrument, Hudson. | 2 forceps, vulsellum, Chassaignac. |
| 1 cystoscope, electric, Otis. | 1 forceps, vulsellum, Henrotin. |
| 1 dilator, Kolmann. | 2 forceps, vulsellum, Museux. |
| 4 dilators, grooved, silver. | 1 forceps, vulsellum, Tuttle. |
| 2 dissectors, dry, Allis. | 2 gouges, Buck. |
| 1 dissector, dry, Watson-Cheyne. | 2 gouges, Bruns. |
| 1 elevator, periost., Mass. General Hosp. | 2 handles for Gigli saw. |
| 1 elevator, periosteal, Farabeuf. | 2 holders for Gigli saw. |
| 2 face pieces, for Bennett inhaler. | 2 holders, needle, Edebohl. |
| 12 forceps, artery, Ochsner, 7½-inch. | 2 hones, razor. |
| 12 forceps, artery, Kelly's pattern. | 1 inhaler, chloroform, Yankauer. |
| 1 forcep, Bozeman. | 1 inhaler, ether, Fowler. |
| 6 forceps, compression, Pratt. | 2 irrigators, Valentine. |
| 3 forceps, dissecting, m. t., 6.5-inch. | 1 irrigator, rectal, Kemp. |
| 3 forceps, dissecting, m. t., 5.5-inch. | 1 irrigator, Shea. |
| 3 forceps, dissecting, m. t., 4.5-inch. | 1 knife, plaster, Esmarch. |
| | 1 lamp, therapeutic. |
| | 1 mallet, mastoid, Hajek. |
| | 1 mask, Oelsner. |
| | 1 needle, aneurism, 3 points. |
| | 12 needles, aspirating, for spinal punctures. |

4 needles, Deschamps.	1 retractor, self-retaining, Mayo.
2 oxygen inhaling apparatus.	2 retractors, blunt, Volkmann.
1 pantostat with electrical cables and attachments for cautery and bone drills.	2 retractors, sharp, Volkmann.
4 percolators for salvarsan.	1 saw, Wyeth (set).
3 phonendoscopes, Bazzi-Bandi.	12 scalpels, Mayo.
6 probes, silver, with eye.	12 scalpels, Tiemann.
3 probes, silver, without eye.	6 scalpels, Kny-Scheerer.
3 probes, silver, with eye, 8-inch.	36 scissors, assorted (sharp, blunt, and dissecting).
1 probe, gallstone, Ochsner, 14-inch.	2 screws, oval, hard rubber.
2 proctoclysis outfits, electric.	2 shears, plaster, Esmarch.
1 proctoscope.	2 scoops, gallstone.
1 raspatory, Doyen.	1 snare, tonsil.
1 raspatory, Farabeuf.	1 speculum, Gant.
1 raspatory, Langenbeck.	1 sphygmomanometer.
1 raspatory, Ollier.	2 sterilizers, electric.
6 reflectors, parabolic.	1 switchboard, electric, therapeutic.
1 resuscitating device.	2 syringes, antitoxin.
2 retractors, bifur., blunt.	2 syringes, all glass, 3 cubic centimeters.
4 retractors, Eastman.	12 syringes, hypodermic.
2 retractors, Freer.	1 syringe, deep urethral.
2 retractors, Ingleman, 3-inch.	3 testicles, celluloid.
2 retractors, Ingleman, 1½-inch.	1 tractor, prostatic, Young.
2 retractors, Hagedorn.	1 trephine, De Vilbiss.
2 retractors, Israel.	12 trays, instrument, 5½ by 7 inches.
2 retractors, Langenbeck.	1 trephining set with motor.
1 retractor, mastoid, Allport.	1 trocar, gall bladder, Ochsner.
2 retractors, Parker.	1 trocar, Mount Sinai.
2 retractors, prostatic, Young.	

The small operating room will contain the following:

1 instrument and dressing sterilizer.	1 immersion stand.
1 operating table.	1 bowl stand.
1 instrument table.	1 irrigating stand with books.
1 instrument cabinet, small.	

Instruments provided for in main operating-room outfit.

Etherizing room will be provided with:

2 etherizing carriages.	2 anesthetists' tables.
2 etherizing stools.	

The sterilizing room will contain:

1 battery of sterilizers, utensil, dressing, instrument, and water.	1 blanket, bedpan, and solution warmer.
1 dressing sterilizer, large, container type.	18 extra containers for dressings.

The specialist's room for eye, ear, nose, and throat work will be provided with one instrument cabinet, specialist's table, and stool, and the following instruments and appliances:

1 acoumeter, Politzer.	25 applicators, aluminum.
1 apparatus, suction.	12 applicators, assorted.
1 apparatus, suppression.	3 applicators, ear, Dean.

- 4 atomizers, albolene.
- 1 bag, leather, 15-inch.
- 2 bags, Politzer.
- 1 basin, pus, 12 by 8 inch.
- 2 brackets, Morefield.
- 1 canula, frontal sinus.
- 1 canula, sphenoidal.
- 1 case, instrument, eye.
- 6 catheters, eustachian.
- 1 chair, oak, adjustable.
- 2 charts, astigmat.
- 1 conchotome, Hartmann.
- 4 curettes, adenoid, assorted sizes.
- 1 curette, ear, Buck.
- 1 curette, ethmoidal and gouge, Bryan.
- 1 curette, chalazion, Meyrowitz.
- 1 curette, Gottstein.
- 2 cystotomes.
- 1 dilator, lachrymal.
- 12 droppers and bottles, antiseptic.
- 1 ear instrument, Brandegee (set).
- 2 electrodes, eye, Meyrowitz.
- 4 electrodes, nasal.
- 1 elevator, septum, Ballenger.
- 1 elevator, blunt, Hajek.
- 1 forcep, adenoid, Hodge.
- 1 forcep, advancement, Reese.
- 1 forcep, bony septal, Hurd.
- 1 forcep, capsule.
- 2 forceps, chalazion.
- 1 forcep, cilia, May.
- 1 forcep, dressing, nasal, Hartmann.
- 2 forceps, dressing, long.
- 1 forcep, dressing, ear, Hartmann.
- 1 forcep, ear, Hartmann.
- 1 forcep, ear, Wild.
- 2 forceps, entropium, Snellen.
- 1 forcep, fixation, without catch.
- 1 forcep, fixation, angular jaw.
- 1 forcep, fixation, braced with catch.
- 2 forceps, tonsil, Mikulicz.
- 2 forceps, iris.
- 1 forcep, iris, curved, m. t.
- 1 forcep, perpendicular, plate, Foster-Ballenger.
- 1 forcep, septum, Jansen.
- 1 forcep, septum, Kyles.
- 1 forcep, tonsil, Roser.
- 1 forcep, tonsil, Tyding.
- 1 gag, mouth, Whitehead.
- 1 globe protector, Axenfeld.
- 1 gouge, foreign body.
- 1 guillotine, tonsil, Ballenger.
- 1 guillotine, Sluder.
- 1 headlight, electric, Jansen.
- 1 holder, cotton, Phillip.
- 1 hook, iris, sharp and blunt.
- 3 keratomes, angular, Jaeger.
- 2 knives, turbinate, Ballenger.
- 1 knife, submucous, Ballenger.
- 1 knife, swivel, Ballenger.
- 1 knife, swivel, medium, Ballenger.
- 3 knives, cartilage, Ballenger.
- 4 knives, cataract, Graefe.
- 2 knives, cataract, medium size, Graefe.
- 2 knives, cataract, large size, Graefe.
- 2 knives, cataract, Green.
- 1 knife, lachrymal, Agnew.
- 1 knife, needle, Noyes.
- 1 knife, needle, Weeks.
- 2 knives, tonsil, Freer.
- 1 knife, tonsil, Tyding.
- 1 laryngoscope, electric, De Zeng.
- 1 lamp, color, testing, Eldridge-Green.
- 6 lamps, electric, spiral filament.
- 2 lamps, ward, Priestly-Smith.
- 1 lens, measure, Geneva.
- 2 lenses, condensing.
- 1 lens, trial, test set, complete.
- 1 loupe, binocular, Berger.
- 1 microscope, corneal.
- 1 mirror, head, Fränkel.
- 1 mirror, head, Worrall.
- 1 nasal instrument set, Asch.
- 1 nasal instrument set, Schoetz.
- 1 needle, antrum, Abrahams.
- 1 needle holder, Sands.
- 1 needle holder, Knapp.
- 1 ophthalmoscope, electric, De Zeng.
- 1 otoscope, pneumatic.
- 1 otoscope, electric, lens and three tubes.
- 1 otoscope, magnifying, De Zeng.
- 1 perforator, antrum, Myles.
- 1 perimenter, registering.
- 1 pharyngoscope, De Zeng.
- 1 phoro-optometer.
- 2 powder blowers, aseptic.
- 1 prism case, Meyrowitz.
- 1 probe, lachrymal, Theobald (set).
- 1 probe, sphenoid, Andrews.
- 1 pump for nebulizer.
- 1 pump, Meyrowitz.
- 1 punch, turbinate.
- 1 punch, sphenoid.
- 1 receiver, air, and nebulizer apparatus.
- 1 retinoscope, electric, De Zeng.

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|--|--|
| 1 retractor, lachrymal, Müller. | 1 speculum, nasal, long, Killian. |
| 2 retractors, eyelid, two sizes. | 6 splints, nasal, Andrews. |
| 1 retractor, mastoid, Jansen. | 1 spout, ear, tube. |
| 1 retractor, mastoid, Fry. | 12 spray tubes, Davidson. |
| 6 rings, ocular, mask. | 2 spoke shaves, Moure. |
| 1 rongeur, Holbrook-Curtis. | 2 spuds, sharp, plain. |
| 1 saw, nasal, Curtis. | 1 sterilizer, electric. |
| 1 saw, nasal, Myles. | 4 stools, adjustable, oak. |
| 1 saw, nasal, Webster. | 1 syringe, fountain, ear, Todd. |
| 1 scissors, enucleation, heavy. | 1 syringe, ear, all metal. |
| 2 scissors, iris, sharp, curved. | 1 syringe, tonsil, Street's. |
| 1 scissors, iris, sharp, straight. | 1 syringe, lachrymal. |
| 3 scissors, iris, Wecker. | 1 syringe, laryngeal. |
| 3 scissors, strabismus. | 1 test type for board. |
| 1 scissors, tonsil, Dean. | 1 test-type cabinet, illuminated, Meyrowitz. |
| 1 scissors, tonsil, Grow. | 1 trans-illuminator, Coakley. |
| 1 scoop, lens, Levi. | 1 trans-illuminator, Sachs. |
| 1 separator, tonsil, Freer. | 1 tonometer, Schoetz. |
| 1 shield, eye, Fuch. | 1 tube, diagnostic, Toynebee. |
| 1 skiascope, Gruening. | 2 trial frames, adjustable. |
| 1 snare, tonsil, Tyding. | 1 tuning fork, Dench. |
| 1 speculum, aural, set of three. | 1 set tuning fork, Hartmann. |
| 1 speculum, eye, Weeks. | 1 vaporizer, Dench. |
| 1 speculum, eye, silver. | 1 vision test cabinet, Grow. |
| 2 speculums, nasal, Bosworth. | 1 whistle, Galton. |
| 2 speculums, nasal, self-retaining. | |
| 1 speculum, nasal, self-retaining, Good. | |

The X-ray equipment should include the following:

- | | |
|---|--|
| 1 interrupterless transformer with high-frequency attachment. | 1 lead-lined box large enough to take 14 by 17 plates. |
| 1 radiostereoscopic table with tube stand attached. | 1 treatment speculas, assorted. |
| 1 trochoscope. | 1 opaque apron. |
| 1 stereoscope. | 1 opaque heavy rubber gauntlet gloves (pair). |
| 1 vertical fluoroscope. | 1 plate marker. |
| 1 body localizer. | 1 foot switch. |
| 1 eye localizer. | 12 tubes, assorted. |
| 1 automatic time switch. | 1 Benoist penetrometer. |
| 1 Bauer qualimeter. | 1 Holzknacht radiometer. |
| 1 lead screen. | 1 lead foil. |
| 1 illuminator for negatives. | 3 mm. sheet aluminum, sole leather. |
| 1 lead-protected fluoroscope, 8 by 10. | 1 auto-condensation pad. |
| 3 intensifying screens, 8 by 10, 11 by 14. | Vacuum electrodes, assorted. |
| 14 by 17, with plate holders for the same. | 1 tube rack. |

PHOTOGRAPHIC SUPPLIES.

- | | |
|---|---|
| 1 large camera. | 1 plate washing box. |
| 1 small camera. | 1 Caldwell ruby lamp. |
| 1 plate box, lead lined, for stowing plates up to 14 by 17. | 1 8 by 10 inch porcelain enamel tray. |
| 1 sheepskin. | 2 10 by 12 inch porcelain enamel trays. |
| 1 McCallister & Wiggan Benoist scale. | 2 14 by 17 inch porcelain enamel trays. |
| | 1 large negative drying rack. |

1 photographer's scales.	12 32-ounce salt mouth bottles.
$\frac{1}{2}$ gross dental films.	1 16-ounce glass graduate.
3 dozen 8 by 10 inch Cramer plates.	1 8-ounce glass graduate.
3 dozen 11 by 14 inch Cramer plates.	1 4-ounce glass graduate.
2 dozen 14 by 17 inch Cramer plates.	1 thermometer glass stirring rod.
2 dozen 8 by 10 inch Ilford plates.	4 ounces of hydrochinon.
2 dozen 11 by 14 inch Ilford plates.	4 ounces of pyrocatechin.
2 dozen 14 by 17 inch Ilford plates.	1 pound of sodium sulphite (anhydrous).
1 dozen pairs of black and orange envelopes for plates 8 by 10 inches.	$\frac{1}{2}$ pound of potassium bromid.
1 dozen pairs of black and orange envelopes for plates 11 by 14 inches.	1 pound of potassium carbonate.
1 dozen pairs of black and orange envelopes for plates 14 by 17 inches.	4 pounds of hypo.
	$\frac{1}{2}$ pound chrome alum.
	$\frac{1}{2}$ pound potassium ferrieyanid.

The dental equipment would consist of two complete dental outfits, Navy standard, as enumerated in the revised supply table.

Miscellaneous medical and surgical equipment not included in foregoing lists;

1 autopsy table.	2 sewing machines.
30 caskets, Navy standard.	24 stretchers, Stokes.
1 case, ambulance, metal.	18 tents, hospital.
6 chairs, rolling, invalid.	12 thermometers, bath.
150 cots, folding.	20 thermometers, house.
2 disinfectors, large.	6 restraint apparatus.
1 hyperemic treatment apparatus.	Hydrotherapeutic room fixtures.
1 obstetrical bag.	Books for library (to be selected).
6 refrigerators, nursery, ward use.	2 embalming outfits.

BEDDING AND LINEN.

144 aprons, operating, linen.	1,500 pillowcases.
1,000 bedspreads.	24 pillowcases, rubber.
1,500 blankets.	3,000 sheets, cotton.
144 caps, operating.	72 sheets, rubber.
144 gowns, operating.	288 shirts, hospital.
288 mosquito bars.	500 slippers, hospital (pairs).
1,000 pajamas, coats.	500 towels, bath.
1,000 pajamas, trousers.	4,800 towels, hand.

LABORATORY EQUIPMENT.

1 filter, Berkefeld, large.	1 measure, bone, in inches and millimeters.
25 quires filter paper, gray, 16 by 20 centimeters.	1 water bath, diameter 200 millimeters.
1 sterilizer, No. 4.	2 flasks, volumetric, 50 cubic centimeters, with ground-glass stopper.
2 hemacytometers, Thoma-Zeiss, complete.	4 flasks, volumetric, 100 cubic centimeters, with glass stoppers.
12 jars, preserving, 500 cubic centimeters.	2 flasks, volumetric, 500 cubic centimeters, with glass stoppers.
6 jars, preserving, 2,000 cubic centimeters.	2 flasks, volumetric, 1,000 cubic centimeters, with glass stoppers.
6 jars, stone, capacity 16 liters, with lid.	24 flasks, Erlenmeyer, 100 cubic centimeters.
1 magnifier, tripod.	

- 24 flasks, Erlenmeyer, 200 cubic centimeters.
- 24 flasks, Erlenmeyer, 500 cubic centimeters.
- 2 flasks, Erlenmeyer, filter, with side neck, 1,000 cubic centimeters capacity.
- 2 flasks, Fernbach's, 2,000 cubic centimeters.
- 2 funnels, rapid filter, 160 millimeters in diameter.
- 3 funnels, plain, 25 millimeters in diameter.
- 3 funnels, plain, 50 millimeters in diameter.
- 3 funnels, plain, 100 millimeters in diameter.
- 1 funnel, Buchner's, porcelain, 125 millimeters.
- 50 quires filter paper, S. & S. No. 575, 12½ centimeters diameter.
- 2 graduates, conical, glass base, 500 cubic centimeters.
- 2 graduates, conical, glass base, 250 cubic centimeters.
- 1 tester, milk, "Agos," for 6 bottles.
- 24 bulbs, rubber, capacity 20 cubic centimeters.
- 4 pairs gloves, rubber, heavy, sizes 7 and 8 (2 pairs of each size).
- 50 caps, rubber, for test tubes, 18 millimeters.
- 50 caps, rubber, for test tubes, 25 millimeters.
- 1 shears, laboratory.
- 2 spatulas, steel, 75 millimeters.
- 2 spatulas, steel, 150 millimeters.
- 2 spoons, agate, large.
- 4 dishes, staining.
- 3 jars, staining, Coplin.
- 1 stove, vaporizing, oil.
- 1 support, funnel.
- 4 racks, test tube, for 24 tubes.
- 6 racks, test tube, for 6 tubes.
- 6 baskets, test tube, square.
- 2 thermometers, chemical, graduated 100° C.
- 2 thermometers, chemical, graduated 300° C.
- 2 trays, agate, 225 by 175 millimeters, 50 millimeters deep.
- 2 trays, agate, 275 by 350 by 50 millimeters.
- 2 tripods, iron, diameter 100 millimeters.
- 12 tumblers, glass.
- 1 albuminometer, Esbach.
- 100 vials, homeopathic, capacity 10 cubic centimeters, with corks.
- 10 watch glasses, Syracuse, solid.
- 2 wire gauze, copper, 30 centimeters square, mesh No. 20.
- 1 microtome, Minot, rotary.
- 1 microtome knife for the Minot rotary.
- 1 hone, yellow Belgian.
- 1 strop, razor, two-piece, 3 inches wide.
- 12 needles, irido-platinum, smooth bore, smooth shank, to fit 5-cubic-centimeter syringe.
- 6 slide boxes, to hold 100 slides each.
- 2 bottles, aspirating, 4 liters.
- 1 scale, Kohlbusch.
- 1 scale, Troemner's, 30 centimeters diameter of pans.
- 6 pipettes, 25 cubic centimeters, plain.
- 12 pipettes, 10 cubic centimeters, plain.
- 12 pipettes, 5 cubic centimeters, plain.
- 24 pipettes, 1 cubic centimeter, plain.
- 48 pipettes, Mohr's, 1 cubic centimeter, graduated in one one-hundredths.
- 12 pipettes, Mohr's, 2 cubic centimeters, graduated in one-fiftieths.
- 48 pipettes, Mohr's, 5 cubic centimeters, graduated in one-tenths.
- 36 pipettes, Mohr's, 10 cubic centimeters, graduated in one-tenths.
- 24 tubes, centrifuge, graduated, 15 cubic centimeters, heavy wall and end.
- 60 tubes, centrifuge, ungraduated, 15 cubic centimeters, heavy wall and end.
- 2 urinometers.
- 10 feet tubing, rubber, 4 millimeters inside diameter, heavy walled.
- 6 clamps, Hoffman's screw.
- 3 rice cookers, double boiler, large.
- 3 rice cookers, double boiler, medium.
- 2 rice cookers, double boiler, small.
- 24 dropping bottles, TK patent, 30 cubic centimeters.
- 1 labels, slide, 500 in a book.
- 5 syringes, all glass, 2 cubic centimeters, irido-platinum needle.
- 6 syringes, all glass, 20 minim, irido-platinum needle.

- 6 clamps, spring, Mohr's, large.
- 2 clamps, apparatus, universal.
- 2 clamps, burette.
- 6 clamps, test tube.
- 2 pumps, vacuum, Chapman's.
- 36 stoppers, rubber, with two holes, No. 2.
- 12 stoppers, rubber, no holes, No. 2.
- 5 pounds glass tubing for blood systems, 3 millimeters inside diameter, soft German glass.
- 10 pounds glass tubing, 7 millimeters inside diameter, soft German glass.
- 3 dishes, evaporating, porcelain, 25 cubic centimeters, No. 00.
- 3 dishes, evaporating, porcelain, 50 cubic centimeters, No. 1.
- 3 dishes, evaporating, porcelain, 100 cubic centimeters, No. 3.
- 2 dishes, evaporating, porcelain, 500 cubic centimeters, No. 7.
- 12 forceps, dressing, heavy.
- 24 forceps, cover glass, Stewart.
- 3 dishes, stender, 90 by 60 millimeters.
- 3 dishes, stender, 24 by 36 millimeters.
- 1 post-mortem case.
- 48 rubber nipples, "Maws," No. 46, no holes.
- 1 centrifuge, electric, size 1, to be equipped with tube holder.
- 4 cylinders, glass, graduated in cubic centimeters, 100 cubic centimeters.
- 2 cylinders, glass, graduated in cubic centimeters, 500 cubic centimeters.
- 4 cylinders, glass, graduated in cubic centimeters, 25 cubic centimeters.
- 1 lamp, blast, complete (Turner).
- 3 graduated test tubes, heavy walled, with lip, 15 by 150 millimeters.
- 2 graduated test tubes, heavy walled, with lip, 16 by 150 millimeters.
- 4 nests beakers, nested from 1 to 5.
- 100 petri dishes, low form, 10 cubic millimeters diameter.
- 25 Petri dishes, low form, 15 cubic millimeters diameter.
- 25 paper filters, S. & S. No. 597, 58 by 58 cubic millimeters.
- 2 Doremus-Hinds' ureometers, with foot and side arm.
- 4 burettes, 50 cubic centimeters, cap, Schellbach's, with blue enameled strip on white enameled background, graduated in one-tenths.
- 1 syringe, rectal, hard rubber, cap, 250 cubic centimeters.
- 1 syringe, hard rubber, double-acting, for post-mortem work.
- 1 incubator, Hearson's, for oil heating, 12 by 12 by 14 cubic millimeters.
- 1 sterilizer, Arnold, circular, size 28.5 by 31 cubic millimeters, copper.
- 100 cases, mailing, to hold 1-ounce bottles, screw cap, cardboard.
- 50 cases, mailing, cardboard, screw cap, to hold 2-ounce, wide-mouth specimen bottle.
- 100 bottles, specimen, wide mouth, cap, 2-ounce, with corks.
- 3 files, letter, Shannon, wood (with punch, 1).
- 12 Nessler tubes, graduated to 50 and 100 cubic centimeters.
- 2 mortar and pestle, wedgewood, 90 millimeters diameter.
- 2 mortar and pestle, wedgewood, 150 millimeters diameter.
- 3 pounds glass rods, soft German, 7 millimeters in diameter, 3 feet in length.
- Filter paper, circles, S. & S. No. 597, sizes 7, 11, 15, and 24 cubic millimeters (100 of each size).
- 2 desks, laboratory.
- Bench, working, sinks, etc., as per plan.
- Bottle racks.
- 1 Sahli's hemaglobinometer, complete.
- Aluminum tubes, Purdy style, heavy, 15 cubic centimeters.
- 3-grain glass slides, plain, 75 by 25 millimeters.
- 12 glass slides, concave, 25 by 25 millimeters.
- 2-ounce cover glasses, square, No. 1, $\frac{3}{4}$ -inch.
- 2-ounce cover glasses, square, No. 1, $\frac{3}{4}$ -inch.
- 3 platinum loops.
- 4 tubes Canada balsam, in xylol.

50 cubic centimeters cedar oil, immersion.	1 ounce maltose, chemically pure.
500 cubic centimeters xylol, chemically pure.	6 ounces glucose, chemically pure.
200 cubic centimeters anilin, chemically pure.	8 ounces lactose, chemically pure.
50 grams methylene blue.	1 ounce mannit, chemically pure.
20 grams gentian violet.	200 grams agar-agar, powdered.
10 grams toluidin blue.	300 grams peptone, Witte's, powdered.
4 wax pencils.	2 pounds gelatin, gold label.
150 cubic centimeters Balch's stain.	6 pounds alcohol, absolute, methyl, acetone free, in 1-pound bottles.
10 grams neutral red.	12 pounds alcohol, absolute, ethyl, in 1-pound bottles.
4 ounces celloidin, in 1-ounce cartons.	24 ampules phenylsulphonphenolphthalein, for kidney tests.
6 ink, chin-chin, Gunthier, in 25 cubic centimeter bottles.	1 pound pyrogallie acid, in 4-ounce tins.
3 pounds paraffin, white, melting point, 56-58° C.	36 guinea pigs.
1 pound paraffin, white, melting point, 44-46° C.	6 rabbits.
2 alcohol lamps, metal, cap. 50 cubic centimeters, screw cap, 75 by 45 by 45 millimeters.	1 sheep.
	40 reagent bottles (as per list).
	3 microscopes.
	1 spectroscope, with comparison prism.

The equipment of the commissary department of hospital ships of the Navy properly comes under the Bureau of Construction and Repair, but as it is very necessary that medical officers should be familiar with this equipment a list of the various apparatus and utensils required is given. A well-conducted commissary department is probably the most important single feature aboard a hospital ship and probably upon no one thing does the success and efficiency of the ship depend so much as upon an efficient, sanitary, well equipped and organized commissary department. Patients must have the proper kind of food well prepared and well served in order to properly respond to and recover from the various diseases. Proper food is a greater factor in the care and treatment of most diseases than medicines.

In view of this the galleys and pantries should be centrally located, convenient to the wards and equipped with the most modern and efficient apparatus, utensils, and labor-saving machinery, as success in the care and treatment of the sick is impracticable should the commissary department break down.

MAIN GALLEY.

2 sixteen-foot ranges, electric or oil.	1 tea urn (60-gallon).
4 steam roasters.	1 coffee urn (60-gallon).
5 stock kettles.	2 steel worktables.
2 four-compartment vegetable steamers	1 combination steam and work table.

GENERAL PANTRY.

1 steel worktable.	1 vegetable peeler.
1 meat cutter.	1 meat slicer.
1 mixing machine.	2 meat blocks.
1 freezer and ice crusher.	

BAKERY.

2 electric or oil bake ovens.	1 steel table.
1 dough mixer.	1 bread cutter and stacker.
2 dough troughs.	

DIET KITCHEN.

1 electric range (6-foot).	1 table, steel, work.
1 warming table, electric.	Shelving, etc.

ISOLATION KITCHEN.

1 electric range.	1 warming oven.
1 table, steel.	

DISH-WASHING ROOM.

1 dish-washing machine with table, etc.	Shelving, etc.
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KITCHEN, MESS, AND PANTRY UTENSILS.

30 bake pans, 21 by 13 by 3½.	5 griddles, steel.
30 bake pans, 15 by 12 by 2½.	50 ice picks.
30 basting spoons, 15-inch.	20 knives, bread.
30 basting spoons, 12-inch.	20 knives, carving, 10-inch.
30 basting spoons, 10-inch.	50 knives, cook's, 3½-inch.
20 bread boxes, 12 by 16 by 13.	10 knives, mincing, 6-inch blade.
30 broilers, 15 by 11.	20 knives, oyster.
20 butler's trays, 16 by 28 by 4.	30 knives, sabatier, 8-inch.
30 cake turners.	30 knives, sabatier, 10-inch.
60 can openers.	30 knives, sabatier, 14-inch.
10 canisters, coffee.	60 ladles, 5-inch.
10 canisters, tea.	10 lamb cleavers.
20 canisters, sugar.	10 sets larding needles.
20 coffee boilers, 3-gallon.	50 agate bowls, 2-gallon.
20 colanders, 16-inch.	50 sirup and catsup pitchers.
20 colanders, 12-inch.	50 mustard pots.
10 cook's pepperboxes.	50 bread carriers.
30 corkscrews.	200 pepper shakers.
20 dish pans, 7½.	200 salt shakers.
20 dish pans, 5.	50 vinegar bottles.
20 dish pans, 3.	1,000 saucers.
20 egg whips.	1,000 cups.
10 fish boilers, 9 by 21 by 8.	50 dishes, butter.
80 forks, carving, 11-inch.	100 dishes, meat.
30 forks, carving, 18-inch.	100 dishes, vegetable.
30 frying pans, 13-inch.	1,000 plates, dinner.
10 graters, half-sheet.	1,000 bowls.



FIG. 1.—GANGOSA LESIONS, GUAM. NOGUCHI NEGATIVE. LESIONS CLOSED UNDER MIXED TREATMENT.

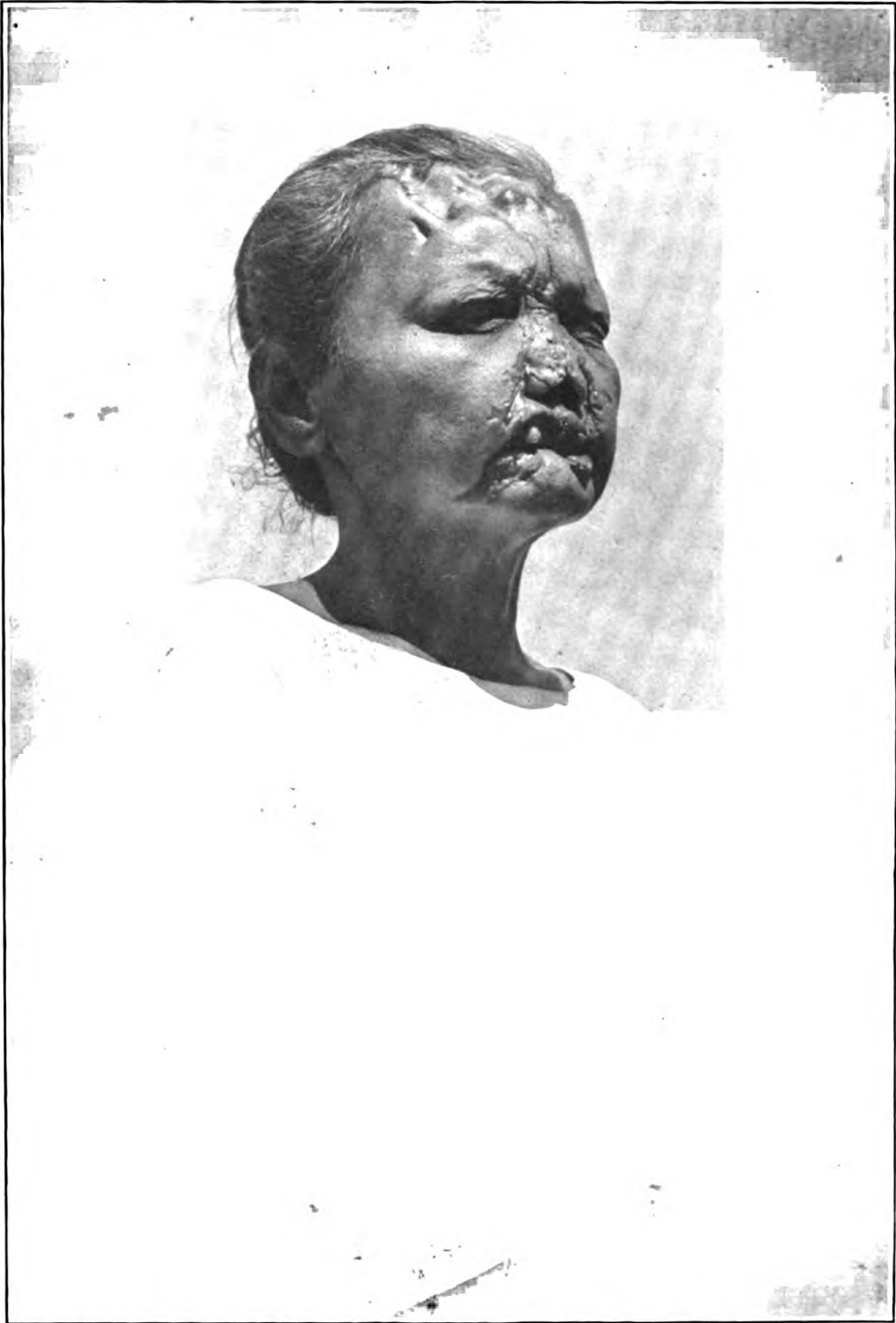


FIG. 2.—GANGOSA LESIONS, GUAM. NOGUCHI NEGATIVE. LESIONS HEALED UNDER ANTISYPHILITIC TREATMENT.



FIG. 3.—EXTENSIVE GANGOSA MUTILATION IN A FILIPINO.



FIG. 4.—HEALED SYPHILITIC ULCERATIONS. FILIPINO.



FIG. 5.—GANGOSA LESIONS, GUAM. HAS HAD YAWS. NOGUCHI WEAKLY POSITIVE.

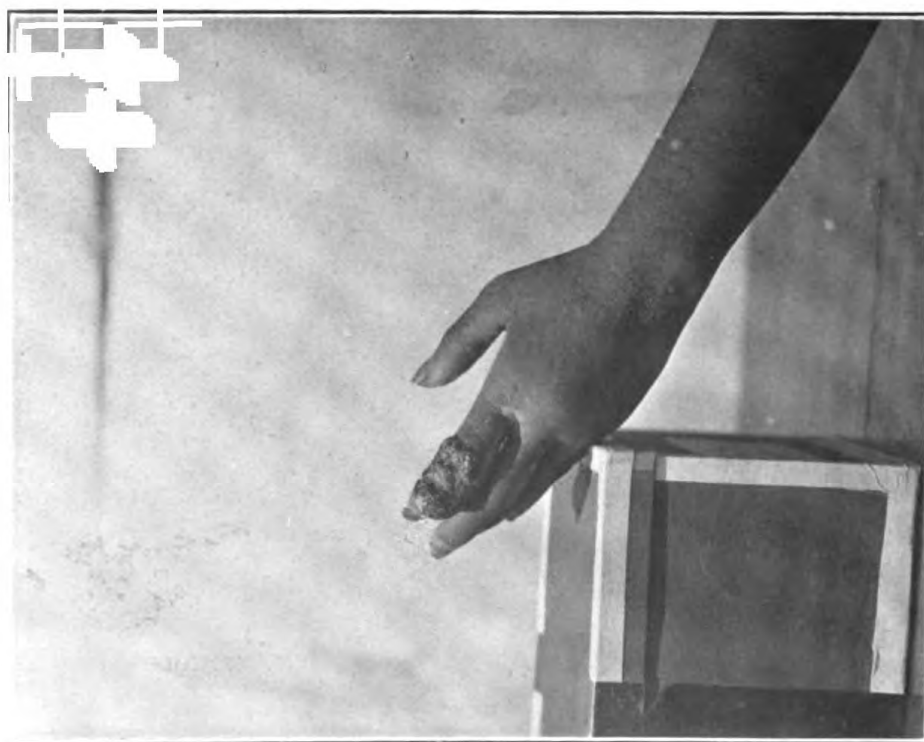


FIG. 6.—GANGOSA LESIONS, GUAM.

No data as to yaws or Noguchi test. Healed under mixed antisyphilitic treatment.

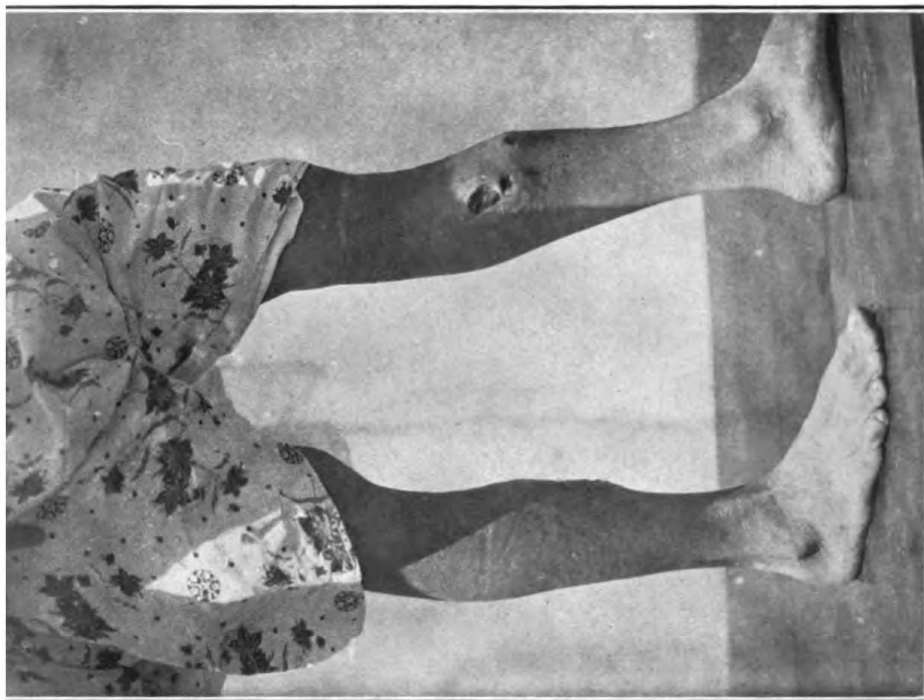


FIG. 7.—GANGOSA LESIONS, GUAM.

Noguchi negative. Healed under antisyphilitic treatment. States never had yaws.

Butler—Tropical Ulcerations.



FIG. 8.—SABER SHIN WITHOUT ULCERATIONS. FILIPINO.



FIG. 9.—SABER SHIN SHOWING SCARRING FROM OLD ULCERATION. SAME AS FIG. 10.

1,000 forks.	20 skimmers, perforated.
1,000 knives.	20 skimmers, wire.
1,000 spoons.	20 spiders, 12-inch.
1,500 spoons, tea.	10 steels, butcher's.
50 bowls, sugar.	10 strainers.
50 pitchers, china.	20 teakettles, 8-quart.
30 lemon squeezers.	20 teakettles, 4-quart.
50 mess pans.	10 wooden bowls.
150 pie plates.	10 cleavers, butcher's, 10-inch.
10 pots, sauce, 8-quart.	10 cleavers, butcher's, 6-inch.
10 pots, sauce, 6-quart.	5 meat saws, 24-inch.
10 potato pounders.	5 meat saws, 18-inch.
10 rolling pins.	30 scoops, coffee, 8-inch.
10 saucepans, covered, 16-quart.	10 brushes, flour.
10 saucepans, covered, 8-quart.	10 knives, baker's.
20 saucepans, covered, 6-quart.	50 pans, bread, 6 loaves.
20 saucepans, covered, 4½-quart.	10 scrapers, baker's.
20 saucepans, covered, 3-quart.	10 carving boards, 24 by 15.
20 saucepans, covered, 2-quart.	20 ladles, 8-inch.
20 scouse kettles, 5-gallon.	10 pepperboxes, 5-pound.
10 sieves, 14-inch.	10 salt boxes, 5-pound.
10 sets skewers.	

THE APPLICATION OF WASSERMANN'S REACTION TO THE SOLUTION OF THE ETIOLOGY OF TROPICAL ULCERATIONS.¹

By C. S. BUTLER, Surgeon, United States Navy.

It may be stated confidently that if the Wassermann reaction could be applied in all cases of ulceration which come to our native tropical clinics for treatment, our conception of the etiology of these conditions would at an early date be greatly simplified. At present there is considerable confusion in the classification of tropical ulcerations, due largely to the fact that we have tried to classify them upon an etiological basis and that the indices which we use to identify the several causes are often inadequate. From an etiological standpoint we may classify ulcerations roughly into three classes: (1) Those due to causes operating locally, (2) those due to some general dyscrasia, and (3) those due to the combined effect of one or more local influences operating upon a subject suffering from some constitutional taint. By far the larger percentage of ulcerations which affect the skin belong to the third class.

Of the several conditions which may operate to produce ulcers it is not at all uncommon to find two or more of them operating in the same body, and, indeed, aiding each other in accomplishing the discomfort or death of the individual affected. Thus we find that

¹ From the laboratory and native clinic of the United States Naval Hospital, Canacao, P. I. Read before the Far Eastern Association of Tropical Medicine, Third Biennial Congress, Saigon, November, 1913.

tuberculosis and syphilis, or tuberculosis and leprosy, or syphilis and leishmaniosis may be operative in the same individual, and ulcers produced by any or all of these causes may be, and often are, complicated by the horde of bacteria and protozoa which harass the "picket line" of any tissue reaction at the surface of the body. Were it not for these contaminative organisms it is not at all unlikely that the skin would know an entirely different process for handling treponematous, leprosy, or tuberculous infiltrations than by ulcerating in response to them. But while extraneous organisms may actually accomplish the liquefaction and death of the tissue, in the vast majority of cases they would be powerless to do this except for the character of the soil upon which they are sown. Throughout the world we find that, with a few unimportant omissions, the great ulcerative triad consists of syphilis, leprosy, and tuberculosis, and the greatest of these is syphilis. In the Tropics we, of course, have the twin brother of syphilis in frambesia, which in a way represents a greater menace to the people among whom it occurs than does syphilis, on account of the fact that the frightful tertiary consequences of this disease are often the first manifestations of which the ignorant natives take any therapeutic notice.

CRITICISM OF INADEQUATE METHODS USED TO DETERMINE CAUSES OF ULCUS.

In the diagnosis of the cause of any ulceration we have to guide us: (1) The clinical appearance, (2) an examination of the stained and fresh secretion from the ulcer, (3) the examination of scrapings or of tissue sections taken at autopsy or biopsy. For identifying the underlying state or dyscrasia we have: (1) The tuberculin reaction, (2) the Wassermann and luetin reactions. It is safe to say that in some cases of ulceration all the data we can elicit are not too much, and indeed, occasionally, not enough. To give an illustration I may mention the fact that judging from the clinical descriptions of different authors, the so-called Delhi boil due to *Leishmania tropica* might be anything in appearance between a boil, properly speaking, and a widespread phagedena (1). But the infection of a syphilitic individual with *L. tropica* might result in the usual type of Delhi boil clinically or on the other hand it might result in a phagedenic ulcer entirely unlike the usual type of Delhi boil. So that the clinical index of an ulcer's etiology is, when taken alone, by no means a safe one. So, too, with the second index, that is an examination of the fresh or stained discharge from ulcers. In the examination of 26 ulcers at San Lazaro Hospital recently, in people who were unquestionably lepers, I found the spirochete and fusiform bacillus of Le Dantec, Vincent, and Plaut in 15 per cent of the cases; streptococci and micrococci in 50 per cent; fusiform bacilli unaccompanied by

spirochetes in 11 per cent; diphtheria-like bacilli in 27 per cent; yeasts in 3 per cent; sporeforming bacilli and an encapsulated bacillus, each once. In this same series of ulcer cases the Wassermann reaction was positive just 13 times, or 50 per cent; while from the exudate as it occurred in the ulcer the *Bacillus leprae* was not noted a single time. This may be an opportune time to state what I believe to be the case in tropical phagedena that about 90 to 95 per cent of these ulcers are syphilitic. In the case just cited, by keeping one's eye too close to the microscope one would fail to discern the real cause of the ulceration, which a cursory clinical examination would not fail to reveal. So, too, in cases of tropical phagedena and the so-called gangosa if we fail to apply the means necessary to unmask the underlying dyscrasia we may search in vain the ulcer exudate, and section to no purpose the tissue of which the ulcer is composed. Regarding the third item in the proper study of ulcers—that is, the examination of stained scrapings and sections—we find that these give us at times very valuable information. Thus if we find acid-fast organisms or blastomyces or leishmania we are at once directed to the probable cause. But as to determining the probable cause of a chronic ulcer upon a histologic basis or by the preponderance of this or that type of body cell in the exudate, it would seem that this method of diagnosis leaves much to be desired. Nature's repertory of tissue reactions to different stimuli is a limited one. If each infecting agent or dyscrasia produced a characteristic histologic picture, diagnosis would be easy; but such is not the case.

In their admirable study of chronic ulcers from the Gambia, Wolbach and Todd (2) close their description of the pathological histology of these ulcers with the following words: "The histological examinations of all of the 17 cases show certain features in common, which are significant when the great difference in the duration of the lesions is taken into account. These common features are the changes in the epidermis and the lymphoid and plasma cell infiltration. In both these respects the processes are similar to those in yaws and in ulcerative or infective granuloma of the pudenda. The plasma cell infiltration is more marked than that of the chronic ulcers due to varices and tuberculosis. It is rather like the infiltration seen in some cases of syphilitic ulcer; endarteritis, however, is absent." It is probable that frambesia from its close parallel to syphilis in all other regards also closely copies it in the manner of its producing ulcerations of the skin. I am sure that I have seen endarteritis in an otherwise typical frambesial fungating ulceration. Castellani and Chalmers (3) state that "there is no individual histological character which exceptionally might not be present in both syphilis and frambesia." Fordyce (4) in considering the histological diagnosis of his case of gangosa says "it is probable that the affection was dis-

tinct from yaws, as such vascular changes, giant cells, small number of leucocytes and great disintegration of fibrous stroma are not characteristic of the latter. It is likely that many of the so-called tertiary manifestations of yaws are in reality not due to that disease, but to another infection identical with the one under consideration. * * *

"It was difficult to exclude syphilis microscopically, but the presence of many giant cells and the less definite perivascular sheathing might be considered in favor of another diagnosis."

Musgrave and Marshall (5) agree that the histological pathology of their case of Philippine gangosa is sufficiently like that of Fordyce's case to be considered as belonging to the same class. I have quoted these authors at some length in order to show that these ulcerative processes from cases in different parts of the world, cases of tropical ulcer from Africa, and of the so-called gangosa from Guam, Panama, and the Philippines are sufficiently like syphilitic or frambesial lesions to make their anatomical differentiation difficult or impossible even by experts in histo-pathology.

TYPE OF WASSERMANN REACTION USED AND RESULTS.

It was therefore of enormous importance to tropical medicine when the reaction was perfected which enables us to define with accuracy the presence or absence of the chief of these diseases causing ulceration. Among some of the native peoples of the Tropics the extent of infection with syphilis is appalling. When we consider the widespread infection in some localities and recall the fact that most of these peoples are ignorant of the complaint from which they suffer, never having received treatment perhaps for many generations, it is little wonder that the disease as it appears in the Tropics is a bit confusing in its symptomatology, for such immunity as the human organism can summon to its aid through generations of infection unaided by treatment is theirs, and the now living represent, as Jefferys and Maxwell say, simply the "survival of the fittest."

The type of absorption reaction which I have chiefly used during the past three years was described in a somewhat different form from that which I use by Emery (6) in 1911. The test as I have used it is more nearly described by Stitt (7) in the United States Naval Medical Bulletin for July, 1912.

It is perhaps fashionable to prefer some one adaptation of the Wassermann reaction and to have no good word to say for any other which does not conform in its theoretic aspects, or perhaps in the actual technique of carrying it out, with the test of our choice. In criticism of this attitude I would like to say that so long as the principle of absorption of complement is not violated, and care is taken in the preparation and standardization of our materials and in carry-

ing out the test, any one of four or five applications of Wassermann's reaction is admirable. However, only in the hands of a man who is willing to develop the test for himself and who learns by experience how to account for his mistakes can results be depended upon. In such hands perhaps some one test might prove a little better than some other and might enable the observer to pick out a few more cases correctly. The question of expediency often comes into the choice of a test. If, for instance, guinea pigs are not available or can not be successfully reared a population should not be doomed on that account to forego the diagnostic advantages of a perfectly correct Wassermann reaction. I have used the Noguchi test requiring guinea-pig complement, and the Emery test, using native complement. They are both excellent. The criticism that in Emery's test your complement can not be titrated, and changes with each test has little value when we recall that the Wassermann reaction can hardly be made to tell successfully what degree of syphilis a man has in terms of units. In standardizing our hemolysin with any complement we have to allow some leeway on the side of a possible excess, which with a high potency complement might give us a wrong negative reading in the test instead of a correct positive one. But I have found in using the Emery test that when this allowance has been made and the hemolytic paper standardized for one human serum, lack of complete hemolysis in the control tube of the test is so rare as to be negligible. In nearly 3,000 tests done by the Emery technique I have had to throw out a test for lack of hemolysis in the control on an average of perhaps once in 500 tests. This series includes 200 cases of leprosy, in which disease deficiency of complement is supposed to occur with a fair degree of constancy. The following figures which represent the results obtained by Emery's test upon 647 natives of the Philippines will perhaps give some idea of the widespread infection of the lower class Filipinos by syphilis.

Of 200 lepers, 89 were positive and 111 negative, or 44.5 per cent positive and 55.5 per cent negative.

Of 373 natives who applied at the native clinic for treatment and whose symptoms warranted a suspicion of syphilis, 189 were positive and 193 were negative, or of this suspected lot 48 per cent positive and 52 per cent were negative.

Of 74 prisoners in the tuberculosis ward of Bilibid Prison hospital, taken without selection (but among whom a number had clinical evidence of syphilis), there were 16 positives and 58 negatives, or in this vicious class of natives the percentage was 21.6 per cent positive and 78.4 per cent negative.

The total of these 647 natives gives 284 positive results, or 44 per cent.

It will be noted that among 200 lepers the percentage of positive reactions was just a little (approximately 3 per cent) smaller than among the class suspected upon some clinical evidence of having syphilis. If leprous patients react positively to the Wassermann test because of their leprosy, there should be some uniformity in the per cent of positives in different countries. But we can not suppose that a given number of lepers are any the less liable to have syphilis because they have leprosy. On the other hand, as the two diseases are very often transmitted in the same manner, we should expect a higher percentage of syphilis among lepers than among the average population. I know that in many leprous patients with whom I have worked syphilis was a coexistent disease, and I am almost convinced that the difference between 21.6 per cent in the average lower-class population and 44.5 per cent among the lepers represents the difference in the amount of syphilization of the two classes.

I have clinical and laboratory notes upon 30 cases of ulceration of the skin in which tuberculosis, leprosy, sporotrichosis, actinomycosis, and dermal leishmaniosis could be excluded from the diagnosis. Some of these cases were representatives of the so-called gangosa. All of them had characteristics which could in fairness, upon clinical grounds, warrant the diagnosis of *ulcus tropicum*. Of this series of 30 ulcers 26 gave strong positive Wassermann reactions. Many of the sera from these ulcer cases were tried repeatedly as to their power to absorb complement. Several were tried by both the Noguchi and Emery techniques. One case gave several negative results. This was a fungating ulceration of the skin of the abdominal wall. Sections of a portion of this ulceration (the exudate from which showed spirochetes and fusiform bacilli in abundance microscopically) were submitted to Prof. B. C. Crowell, of the University of the Philippines, to whom I am indebted for the histological diagnosis frambesia. Two of these cases for some unknown reason had no Wassermann reaction recorded, but from the clinical notes made, they were in all probability syphilitic in nature. Of the 27 ulcers in those of whom record as to their Wassermann reaction was made, 26, or 96 per cent, gave positive results, and the remaining 1 was histologically frambesial in nature. The readings of Wassermann reactions in this class of cases usually require no interpretation, as, if syphilitic at all, they are tertiary in character, and as none of these natives had ever had any antisyphilitic treatment the reaction was practically always what would be termed "complete inhibition," and I have no hesitancy in saying that in each case the unfortunate native was suffering from syphilis. The figures just cited may seem to show a high per cent of positive results. I believe, however, that if any error has been made it is rather on the side of underestima-

tion than of overestimation of the extent of syphilis among the lower class Filipinos. In Cavite Province there is abundant clinical evidence to back up the Wassermann figures. All types of syphilis are seen, from the stigmata of the congenital conditions to the mutilating ulcerations of the old infection. And with all this evidence of the disease in the living it is a remarkable fact that aside from blood-vascular disease, autopsies disclose very little visceral syphilis or syphilis of the nervous system. Another peculiarity is the small number of primary lesions one sees among the native population. In a province where syphilis is rampant, I have, during nearly three years' experience in a native clinic, seen just three genital chancres in natives. One of these was discovered by accident in a man who had a circinate syphilitic eruption, and the other two patients (one a woman, the other a man) came for treatment because the lesion had in each case become phagedenic. The explanation of this is not far to seek. In an unwashed race the per cent of syphilis insontium is necessarily high. Among ignorant people accustomed to having pus infections of all kinds no notice is taken of a sore which usually neither itches, burns, nor pains, and which eventually heals. Unless some accident happens to the lesion, the native will not apply for treatment, and if the physician ever sees him at all, it will perhaps be months or maybe years later, when, very likely, his tissues having yielded to some mutilating ulceration he shrieks his syphilis abroad under the alias "gangosa." In this connection I wish to quote a paragraph from R. H. Major's article on the Wassermann reaction in the Johns Hopkins Hospital Bulletin, giving the results of the test upon 1,200 cases, the great majority of whom were medical, done during 1911 and 1912 (8).

"Of these 1,200 cases, 239, or 20 per cent, gave positive reactions, while 961, or 80 per cent, were negative. Of the cases giving positive reactions, 55, or 24 per cent (nearly one-fourth), gave no history of a primary sore. The per cent of negroes in the above figures is of some interest. The Wassermann reaction was performed upon 185 negro patients, the great majority being cardiac or cardio-renal cases, but also including numerous other more uncommon diseases. Of this number, 61, or approximately 34 per cent, gave positive reactions, while 124, or 66 per cent, were negative. When this number is compared with the reactions on white patients, it is seen that 34 per cent of negroes compared with 17 per cent of whites gave a positive reaction. This indicates a frequency of positive reactions in negroes twice that of the whites. These figures do not perhaps give a sufficient indication of the greater frequency among negroes, since the total number of reactions performed on the sera of colored patients is considerably less than on the whites."

GANGOSA IN GUAM AND THE PHILIPPINES.

Gangosa and rhinopharyngitis mutilans, as Leys (9) would prefer to call it, are two would-be descriptive names applied to the ulcerative condition which affects so many of the natives of Guam, an island of the Marianna group belonging to the United States and situated about 1,500 miles east of Manila. These names are neither of them descriptive, for the reason that gangosa which refers to the character of the voice, takes no account of those cases of the same process in which the voice may not be affected, and rhinopharyngitis mutilans which refers to the seat of the ulcerative condition gives no hint of the fact that the same ulcerative process may and often does affect any part of the entire skin or may, in the same individual, in addition to affecting the naso-palatal region, also ulcerate any part of his entire skin covering, manifesting in doing so a preference for those elective seats which are characteristic of the syphilitic process the world over.

This condition a good-natured medical profession allowed to be written upon the pages of our textbooks as a distinct entity, "gangosa." Some of the arguments used in making this new disease are very far from convincing. One of these was the simple statement that there was little or no syphilis among these people. It ought not to be necessary for the profession to prove that syphilis exists among a people who had been in contact with Europe and Mexico since March 6, 1521, who were colonized by Spain in 1668 and reduced by disease and the sword from approximately 100,000 to 1,800 within a century, and who within the last 100 years have intermixed so largely with Tagalogs from the Philippines that there is left little if any of the original Chamorro blood (10) (11). We should have been able to preface the existence of syphilis there when the United States took over the island in 1898. And knowing that it had received no treatment we should also have been able to preface the existence of a large number of such mutilating ulcerations as we now know exist there. The statement that the lesions of the so-called gangosa are not curable by antisyphilitic treatment is a mistake, as has been shown by Odell (12) and Garrison (13), and later by Kindelberger (personal communication) and many others. The argument that the *Treponema pallidum* has not been identified from these gangosa lesions may be met by the confident prediction that it probably never will be, as the ulceration is an interlude to the syphilitic process and caused by liquefying and necrosing organisms rather than by the tissue-producing and sclerosing treponema per se. I will not pursue this argument further except to say that the same condition which exists in Guam under the name gangosa also exists in the Philippines, as has been shown by Musgrave, whose clinical

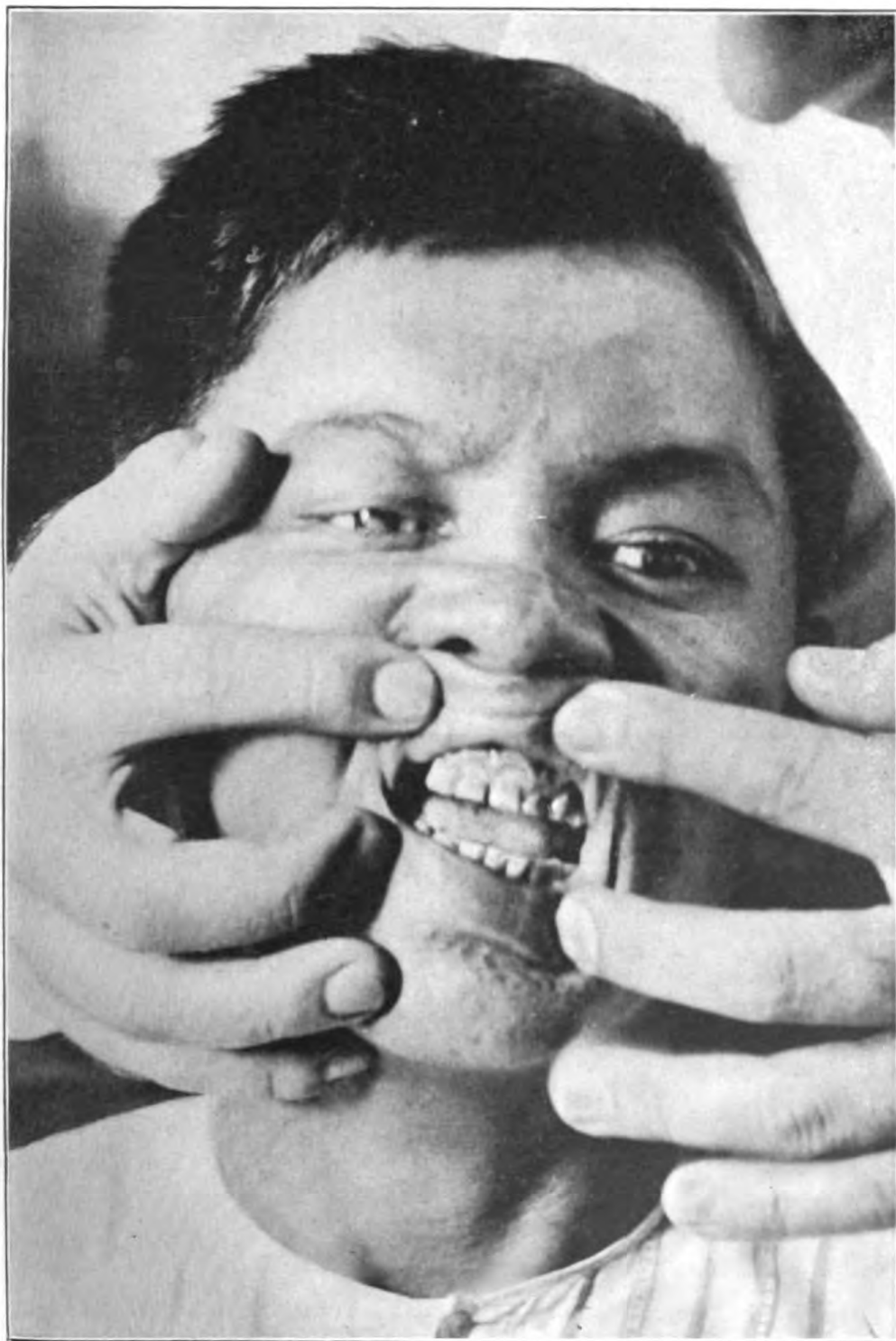


FIG. 10.—NOTCHED TEETH AND INTERSTITIAL KERATITIS. FILIPINO SAME AS FIG. 9.

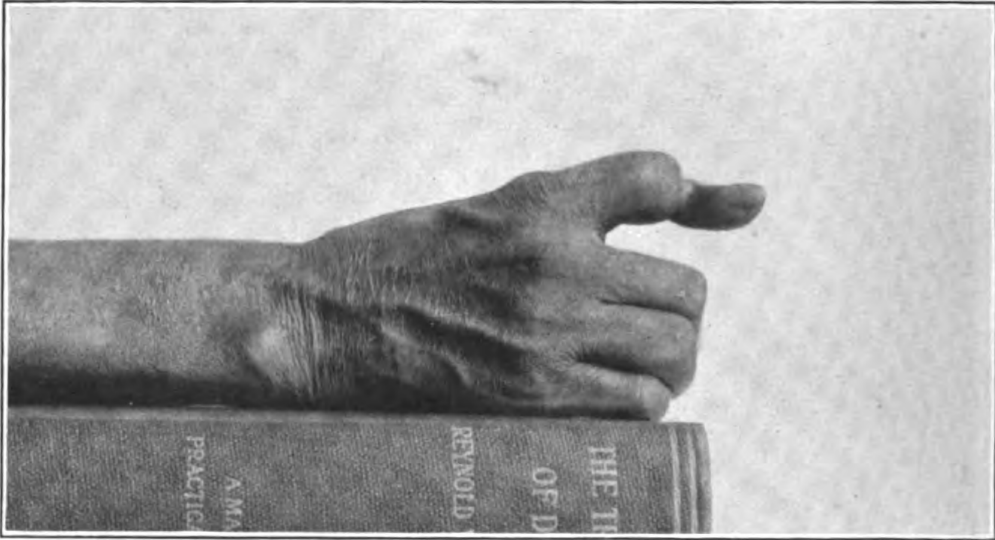


FIG. 11.—FINGER RENDERED USELESS AFTER HEALING FROM A PHAGEDENIC ULCER. FILIPINO.



FIG. 12.—DEFORMED GANGOSA FOOT, GUAM. NOGUCHI NEGATIVE. LESIONS HEALED UNDER ANTISYPHILITIC TREATMENT.



FIG. 13.—EXTENSIVE ULCERATION IN FILIPINO BOY.

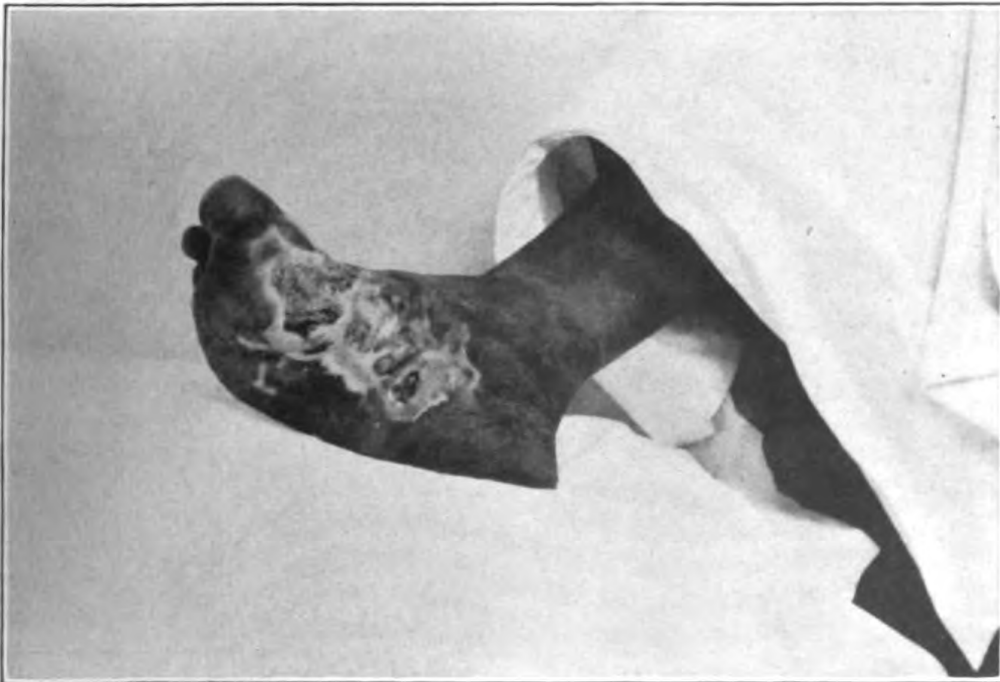


FIG. 14.—GRISTLY HEALING OF TROPICAL PHAGEDENIC ULCERATION.
WASSERMANN POSITIVE. FILIPINO.



FIG. 15.— SYPHILITIC ULCERATIONS IN FILIPINO.



FIG. 16.—TROPICAL ULCER. WASSERMANN POSITIVE. FILIPINO.

Butler—Tropical Ulcerations.



FIG. 17.—GUMMATOUS TROPICAL ULCER. WASSERMANN POSITIVE.



FIG. 18.—BONE LAID BARE BY TROPICAL ULCERATION. POSITIVE WASSERMANN. FILIPINO.

diagnosis was confirmed by Surg. N. T. McLean, United States Navy, who was fully conversant with *Marianna gangosa*. The condition must be prevalent in all parts of the world where syphilis is allowed to go untreated.

This Guam manifestation Crow (14) and Halton (15) have shown is accompanied in from 40 to 82 per cent of the cases by the power of the blood serum to absorb complement. Curtis (personal communication) has shown that 60 per cent of these *gangosa* cases give positive luetin tests. Other ulcerative conditions, such as leprosy or lupus, can be ruled out. Many of these patients had received a considerable amount of treatment at the time the Wassermann reactions were taken. It is safe to say that if we had a series of say 200 or 300 cases of a mental disease which gave the clinical symptoms of general paresis, and that in this series 80 of the cases reacted positively to the Wassermann test when carefully and inquiringly done, we would not hesitate to concur in the diagnosis of syphilis. This exactly parallels the condition of affairs at Guam. We have the conditions which spell congenital syphilis, we have ulcerative lesions which everyone recognizes are typically like those seen in syphilis, and a goodly majority of the sera of these people react in the characteristic manner. It would seem that there can be no doubt but that *gangosa* is syphilis. There are some facts in regard to immunity, however, which I wish to bring to the attention of this association, and I think I can not do better than quote a few paragraphs from a letter recently received from Surg. C. P. Kindelberger, who is now in command of the United States Naval Hospital at Guam. His answers were in response to corresponding questions by me.

"From personal experience," he says, "and from a study of past records, it appears that no authentic cases of primary or secondary syphilis have ever been found in a Chamorro, nor have authentic 'white cases' of *gangosa* been seen. To the best of my knowledge, no syphilitic chancres have ever been acquired by a white person from a native of Guam. The only venereal disease we find here is gonorrhea. From a study of the records of the U. S. S. *Supply*, from January 1, 1913, to date, it is noted that four native enlisted men have been admitted with gonorrhea; but none for chancroid or syphilis, though opportunities for acquiring these latter diseases have been offered by the regular trips to China, Japan, and the Philippines. From the above it would appear that the natives of Guam have a natural or acquired immunity against syphilis.

"We have had cases which corresponded to the description of so-called tropical phagedenic ulceration, but have always classed them here as cases of *gangosa*.

"There are at present only a few open lesions among our gangosa patients; they have all been healed by mixed antisymphilitic treatment internally, intravenous and intramuscular doses of '606' when necessary and scarlet red ointment and skin grafting locally, when required.

"Gangosa is now believed by us to be a tertiary manifestation of untreated yaws, possibly combined with an element of hereditary syphilis; the latter disease having been probably introduced by the crews of whaling vessels, which up to about 12 years ago wintered for many years in Apra harbor.

"The question of the hereditary transmission of gangosa is a puzzling one. I have seen a typical gangosa father and mother with four or five apparently normal children; second, a gangosa father and two gangosa sons, the mother and remaining children being apparently healthy; and, third, one or two gangosas in a large family, the others being apparently free from symptoms of this disease.

"It is estimated that practically 90 per cent of the natives of this island, living in the outlying districts, have had yaws in childhood, but in Agana only about 5 per cent have had this disease.

"We may sum up the facts here concerned in the following words: *First*. In a population of about 11,000 people no case of primary or secondary syphilis has been seen during 14 years by numerous medical men who are accustomed to the recognition of syphilis; *second*, some taint is present in the population, which very often carries over from parent to child and this taint is one which gives the absorption test characteristic of syphilis; *third*, a very large, but not precisely defined, per cent of the population has yaws at some time during life; *fourth*, children who perhaps may never have had yaws may nevertheless suffer from gangosa."

Now, let us recall a few facts in regard to the immunity in syphilis and in yaws. Yaws is not supposed ever to be hereditary, though Le Dantec says "Le pian n'est pas hereditaire et n'est pas transmissible au nourisson par le lait maternel," and again, "Le pian n'est pas transmissible du nourisson a la mere." These two statements represent the laws of Colles and of Profeta when we speak of syphilis. But these so-called laws have taken on another interpretation by reason of the Wassermann reaction. The reason the mother does not acquire syphilis from her child is because she already has the disease, and the reason the child does not acquire syphilis from the mother is that it likewise and of necessity has syphilis when born of a syphilitic mother. It is very probable that syphilis confers no lasting immunity upon the human being as it certainly does not upon animals.

If a new born child has immunity in the strict sense transmitted from the mother, this immunity is a passive immunity and paralleling other passive immunities it would be quickly lost. No race of people is naturally immune to syphilis or to yaws, so far as is known. When syphilis is thoroughly eradicated from the system either by natural means or by medicines the individual can again acquire the disease.

The Wassermann reaction does not separate syphilis and yaws, and while it is absolutely the only test which unmasks syphilis in some of its varied manifestations, it is nevertheless not a sure index of a cure, for we know that the test becomes negative oftentimes even though subsequent events prove that the disease was not cured.

It seems reasonable to conclude that gangosa is either syphilis or yaws. Having in mind the recognized peculiarities of syphilis when operating on a darkskinned, unwashed, untreated, barefooted, but nonalcoholic race, I respectfully invite the members of this association in discussing this paper to offer some explanation of the observed facts that if gangosa is due to yaws alone why does it seem to be transmitted from mother to child, if to syphilis alone why do we never see primary or secondary syphilis as recognized among Europeans, and if to neither yaws nor syphilis why do practically all the untreated cases give the reaction characteristic of syphilis?

It seems to me that Guam offers a unique opportunity for working out upon human beings the unity or duality of this peculiarly human disease, syphilis.

CONCLUSIONS.

1. Syphilis and frambesia constitute a serious problem in public health in the Tropics. They are the chief causes of the mutilating ulcerations of Guam and the Philippines.

2. The Wassermann reaction is of incomparable importance in tropical medicine.

3. Gangosa in Guam and the Philippines comes in the class of complement-absorbing diseases and is on this basis comparable to *tabes dorsalis* and general paresis.

In conclusion I wish to thank Surg. C. P. Kindleberger and Passed Asst. Surg. H. R. Hermes, United States Navy, and Mr. H. W. Elliott, of the Hospital Corps, for much aid rendered in the preparation of this paper.

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SOME THEORIES AS TO THE ORIGIN OF JACKSON'S VEIL.

By JEROME M. LYNCH, Assistant Surgeon, Medical Reserve Corps, United States Navy.

A cause of constipation and other reflex disturbances in the abdominal cavity, which has only been recently studied (particularly by Wilms, Jackson, Mayo, and Connel), is the mobility of the cecum, with what appears to be a veil of adhesions that covers the cecum and occasionally the colon. The question has not yet been definitely settled, whether these adhesions are due to a pericolicitis or a reduplication of the peritoneum during descent of the cecum (Mayo), or simply a delamination, or reduplication of the peritoneum after birth, during the period of fusion. It seems to the writer that the question can not be settled off hand, but that it will require careful observation by pathologists, in conjunction with clinicians, especially of children who die shortly after birth, and just as fusion has taken place. It would also be well if the attention of the anatomists were drawn to this condition so that they might study these cases in the dissecting room. I have no doubt that there is some truth in all the theories that have been advanced, and that unquestionably there are cases where the veil is altered by inflammation, and mistaken for true adhesions. In other cases they are simply embryonal reduplications of the peritoneum. It is the writer's intention to contribute his mite to what has already been written, with the hope of adding something to what has already been said.

To properly appreciate the subject, it is necessary to briefly review a few facts in the early stages of the development of the cecum and that part of the colon derived from the mid-gut.

In all vertebrates, from fishes up the line of divisions, the space between the large and small intestine is demarcated by the ileo-cecal sphincter, which is developed from the circular coat of the bowel.

Occasionally in man the cecum is absent, the only evidence of division between the small and large intestines being the presence of an ileo-cecal valve. This is the normal condition in the frog, and in several mammals, such as the raccoon. In early life there are villi in both the small and large bowel, but by a process of flattening out, or fusion, the villi disappear from the large bowel, and their analogues are known as Lieberkühn's follicles.

A study of the comparative analysis of this region goes to show that the cecum is largest in vegetable-feeding animals, and that there is a corelationship between the development of the stomach and the cecum. In the horse the cecum and cecal colon are complicated, the stomach simple. In animals who live on a flesh diet the cecum is small, as, for instance, man and the dog. The only difference between the latter and man is, that the cecum remains in the second position in the dog, whereas, in man, it descends into the iliac fossa, or the third position. It frequently happens in man that the cecum remains in the second position, under the liver. The functions of the cecum and part of the ascending colon have been likened to the stomach by some physiologists. It is said that there is a to-and-fro movement in this region so that the enzymes continue to digest the food that is left over from digestion in the small intestine. This may be possible in animals, but so far as our own observations go we are inclined to believe that very little, if any, digestion takes place in cecum and colon. I have had under observation several cases where an opening was made oral to the cecum. Some of these cases were studied for several weeks by competent physiological chemists, especially for the presence of enzymes. The only enzyme that was ever found was amorphous. Thus, so far as we go we see in the human being digestive enzymes are absent in the lower end of the ileum.

DEVELOPMENT OF THE CECUM AND COLON.—About the end of the first month a diverticulum appears on the free border of the posterior limb of the U-shaped loop. This elevation or diverticulum later goes to form the cecum and appendix. At first there is no appreciable difference in size between the small and large intestine, but about the first month of fetal life the cecum and colon begin to develop rapidly, the tip of the cecum retaining its fetal dimension. It can be seen from this that the appendix is the undeveloped end of the cecum. About the seventh week of fetal life, owing to the great development of the anterior limb to form the jejunum and ilium, the U-shaped loop is caused to rotate, so that the splenic flexure is forced into its place near the spleen, and the transverse mesocolon is brought into contact with the mesogastrium, which forms the great omentum. Those two layers adhere, and thus the transverse mesocolon is formed by the fusion of the mesenteries of the pos-

terior limb of the U-shaped tube and the dorsal mesogastrium. The rotation places that portion of the mesentery which forms the ascending mesocolon against the duodenum, and at the same time the duodenum is pressed into its permanent position in front of the right kidney. The cecum thus comes to assume its second position, near the right kidney and gall bladder, and remains in this position until birth, when, owing to the growth of the colon, it gradually works its way down to the third and permanent position in the right iliac fossa. This occurs only in animals that assume the upright position.

During the descent of the cecum the appendix may be caught, and, as frequently happens, we have what is known as a postcecal appendix, or extra peritoneal appendix.

At birth the small and large bowel have practically one mesentery, but after birth what is known as a physiological peritonitis takes place and the ascending colon and cecum sink and adhesions take place; thus the cecum and ascending colon are fixed in place.

It is during this period that irregularities in fixation are apt to occur, and will, we think, explain the formation of those cobweb adhesions, or veils, which are now so much discussed. Sometimes fusion fails or is incomplete, and we have mobile cecum or colon, one or both, and the beginning of many subsequent pathological lesions is laid, as, for instance, volvulus of the cecum or colon.

After the colon has descended it rotates slightly inward. This inward rotation is apt to cause a puckering of the outer layer of peritoneum, resulting in a laminar dehiscence. Owing to the constant motion a serum collects between two layers of peritoneum and the blood vessels come under the colon and spray out on the outer surface (the blood supply is probably derived from a branch of the ileocolic artery); thus the membrane is formed and becomes vascularized. The formation of these membranes may be also explained as being due to irregular fusion.

Owing to the traction of the blood vessels and to the attachment of the small intestine, the cecum or colon is more apt to flop to the inner than the outer side when fusion takes place. As a result we may have reduplication of the mesentery over the colon on the other side, with fusion of this layer and vascularization afterwards.

Against the inflammatory origin of these membranes, are the following facts:

1. The regularity of the blood vessels, which usually run about a centimeter apart.
2. The serous surfaces moving one over the other with a fluid between. If due to inflammation, adhesions would take place between the two serous surfaces, as in pleurisy.

The conclusions are:

1. That the membrane described by Jackson is of embryonal origin, but that it may be so altered by inflammation as to appear like an ordinary adhesion.

2. That there are unquestionably adhesions of inflammatory origin, due to perityphlitis and pericolicitis; that these membranes should not be mistaken for those of Jackson as there are many points of difference.

3. That kinking or malformations are due to improper fixation or rotation; and that the length of the mesentery has a great deal to do with the kinking of the ileum.

A RÉSUMÉ OF ETIOLOGICAL FACTORS CONCERNED IN YELLOW FEVER.

By C. B. CAMERER, Passed Assistant Surgeon, United States Navy.

A careful résumé of the present status of our knowledge of the etiological factors concerned in yellow fever as observed and obtained after exhaustive research by different observers during the present century, exhibits one of the greatest advances that has ever been made in the field of medicine, namely, the absolute establishment of the proven manner of transmission and infection of individuals suffering from this particular morbid entity.

Prior to the brilliant and classical achievements of the Army yellow-fever commission, whose experiments were conducted at Camp Columbia, Habana, Cuba, during the American occupation immediately subsequent to the Spanish-American War, various manners and means of infection had been promulgated from time to time. All of them, thanks to our present accurate knowledge based upon scientific facts, have been proven equally fallacious, but the specific etiological factor concerned has as yet remained obscure.

Yellow fever is considered to have been originally a disease of the Antilles, and to have attacked some of Columbus's soldiers in San Domingo, from whence it was carried by them to the mainland. The first lucid account of this disease on record is that of Du Terte, written in Guadaloupe in 1635, but it soon became well known, due to the first great Cuban epidemic of 1648-49. Shortly after this it was first noticed that the disease was carried from port to port by ships, whereupon quarantine laws were first enacted and enforced.

As early as 1794 Drysdale, of Baltimore, and Rush, of Philadelphia, called attention to the unusual prevalence of mosquitoes in their respective cities during the course of the epidemics, though they were comparatively rare during preceding years. Nott, of Mobile, in 1841, published an article wherein he accused some insect of being

the possible transmitter of the disease, but thought the insect in question must be one that crept rather than flew, inasmuch as its spread was apparently inhibited or prevented by bodies of water, shell roads, etc., and that the lime in the latter might be a discouraging factor. It was demonstrated in this same city in 1878 that rigid quarantine of patients, together with sulphur fumigation, would control epidemics.

The first bona fide champion of the mosquito theory of transmission was Dr. Carlos Finlay, of Habana, who, in 1881, attempted to produce mild or abortive attacks of the disease by the bites of the mosquitoes propagated in his laboratory, they having been allowed to feed upon yellow-fever patients. His results were negligible, inasmuch as the necessary time for incubation in the mosquito was not then understood. The first authentic infection by this means occurred the following year, when Gererd allowed a mosquito that had bitten a yellow-fever patient the third day to immediately bite him, with the result that he subsequently developed a mild attack of the disease.

Finlay considered the direct etiological factor to be a tetracoccus, which had been isolated from the heads and probosides of infected mosquitoes, and attempted to prepare a curative serum from this organism, but this germ was later shown to be a pathogenic staphylococcus.

The micrococcus found by Friere in Brazil in 1883 and the *Bacillus icteroides* of Sanarelli, 1897, were both proven not to be the cause of the disease by the Army commission in 1900. Sternberg, becoming deeply interested in the work of Sanarelli, made exhaustive studies of tissues and fluids from yellow-fever patients and isolated a bacillus out of a certain number of cases studied which he called the bacillus "X," the morphology not being quite clear, which was later proven to be allied to the colon group, while the *Bacillus icteroides* was proven to be identical with the bacillus of hog cholera.

In 1900 Reed, Lazear, Carroll, and Agramonte, carrying out the experiments conceived by Sternberg, proved that the disease could be produced by the subcutaneous injection of infected blood into a nonimmune person, and that the disease was not contagious, and was only spread by the bite of the *Stegomyia fasciata*, as it was then called, the name having been recently changed to *Stegomyia calopus* Meigen, 1818, Villiers having previously called a culex "fasciata" in 1789. These conclusions above referred to were only reached after prolonged and elaborate experimentation, which will be referred to later in this article.

While working with the commission investigating the prevailing epidemic at Vera Cruz, Mexico, in 1903, Parker, to whom I personally owe so much, Beyer, and Pothner concluded that the etiologi-

cal factor was an animal parasite which they called the *Myxococcus stegomyia*. This alleged organism was found to appear uniformly in the body cavity of infected mosquitoes, but it was later proven by the same observers to be a yeast normally found in mosquitoes. Two years later this same commission demonstrated that the disease could be communicated by the introduction of infected blood even after filtering through a Chamberlain-Pasteur "B" filter, this causing them to decide that the specific factor or agent must be of ultramicroscopic size.

In 1909 Seidelin described ringlike structures in the erythrocytes of yellow-fever patients, and Stimson during the same year stated that he had found a spirochete uniformly present in the tissues. During the past year Agramonte, working in Habana, has reported the presence of small ovoid bodies occurring in the cytoplasm of the leucocytes during the first few days of the disease. These bodies, according to other observers, are apparently either artefacts or nuclear or thrombocytic fragments.

The propagation of this dread disease by means of the *Stegomyia calopus* has been clearly proven by the work of Reed, Carrol, and Lazear in Cuba, and not enough can be said in praise of these fearless and devoted workers, or of the great benefits to mankind brought about by their labors, Lazear losing his life following an accidental but observed bite by an infected mosquito in the wards of Las Animas Hospital, Habana.

In brief, the conclusions as formulated by the Army board were as follows, viz:

(1) The *Bacillus icteroides* of Sanarelli is proven to be identical with the bacillus of hog cholera, following the suggestion of Theobald Smith.

(2) Yellow fever is transmitted by a mosquito, the *Stegomyia fasciata* (*calopus*); all attempts to bring about infection by means of contaminated linens, discharges, and dejecta from yellow-fever patients, fomites, etc., were proven to be futile.

(3) Experimental yellow fever can be produced by the subcutaneous injection of blood drawn during the first few days of the disease, but this has no direct bearing on the transmission nor prevention of the disease during its epidemic form.

(4) The specific organism is so minute as to pass through the pores of a bacillus-proof filter, and is destroyed by a temperature of 131° F.

It has been shown that crushed and emulsified infected mosquitoes will produce the disease in a typical manner when injected subcutaneously, but not when ingested.

Appropos of immunity it may be well to state that relative immunity may be obtained by inoculations of infected blood heated to

55° C. for five minutes, also that the serum of a convalescent has slight protective power, and, again, during my brief personal observation of this disease it was found that all individuals suffering from furunculosis, gonorrhea, or any pyogenic infection were not attacked, even though repeatedly exposed to infection. This point has been noted by other observers and is doubtless due to increased resistance in the individual brought about to combat the existing infection. One attack confers lasting immunity, secondary attacks being rarely encountered; so-called racial immunity is generally conceded to be actually acquired, as the people living in endemic zones suffer from mild or atypical attacks during infancy or childhood.

Our present knowledge, therefore, of the mode of transmission and infection in this particular disease is reduced to the following, viz:

(a) It is transmitted only by the bite of the female *Stegomyia calopus* mosquito, the poison entering the blood of the person bitten via the saliva puncture.

(b) After becoming infected from a patient in the infective stage the mosquito is not infective for a period of from 12 to 20 days.

(c) The infective principle in the patient's blood disappears after the third to sixth day, subsequent to which time but little fear of infection may be entertained.

(d) The specific etiological factor is thought to be a protozoon, as the disease acts like a protozoal infection, and the theory is advanced by Parker that the life cycle is somewhat similar to that of malaria, with the sexual and asexual cycles reversed, the former occurring in man, the latter in the mosquito.

(e) The incubation period in man appears to be variable; calculated from experimental inoculations, infection, etc., it appears to range from 70 hours to 7 days 5 hours; one case is recorded with an incubation period of 41 hours.

During the recent unfortunate outbreak of yellow fever on board the U. S. S. *Yorktown* I personally observed that the average period of incubation for my series of eight cases ran about 72 hours, the conclusion being that inasmuch as the type of fever at Guayaquil was especially virulent the heavier or more virulent the infection the shorter the incubation period; this is also to be accounted for in part by the number of infected mosquitoes biting the patient.

It has been found that the infective principle is feebly resistant after removal from the body. Its virulence is lost within 48 hours if exposed to the air, but it is retained for three or four days if kept under oil.

Parker has shown that definite changes occur in the bodies of infected mosquitoes, e. g., the stomach walls and salivary systems show distinctive hypertrophy, the lining cells proliferating to a marked degree.

The etiological factor is obviously some form of living organism, as is shown by the time necessary for its development in both man and the mosquito; this, per se, precludes its being of chemical nature.

The longest experimental span of life for an adult female has been found to be 154 days; it has been further shown that eggs laid after a 12-day incubation by infected mosquitoes are also infected and can transmit the disease to the second generation, and that this generation of mosquitoes is infected after 14 days.

Experimental infection in lower animals was successfully produced by Thomas in 1907 in a chimpanzee after an incubation period of three days, a typical attack occurring induced by bites of infected mosquitoes. No other mosquito has so far been proven a transmitter of this disease.

Moreover, it is now known that the cycle of development in the mosquito is inhibited by low temperature, the same as in malaria, and that such development takes place best at a constant temperature of about 30° C.; this is considered as further proof of the protozoal character of the infective principle, whatever it may be.

A few words as to the endemic area of this disease may not be amiss, embracing at present Central America, the West Indies, South America as far as Chile, and the Atlantic coast of Mexico. Guayaquil, Ecuador, is a hotbed of infection, with very high mortality. The west coast of Africa is usually infected, and the disease is considered by some observers to have originated here, being transmitted to the new world by ships carrying African slaves. The potential distribution may be stated to correspond to that of the *Stegomyia calopus*, which is found in tropical regions generally. Epidemics are noted to decrease in virulence the farther removed the focus of infection from the Tropics, where the disease is endemic.

The *Stegomyia* is essentially a "house" mosquito, and seldom goes farther than 400 yards from its chosen breeding place, and will bite at all hours of the day, even out in the bright sunlight, but preferably in the evening about dusk.

During the present year Balfour has advanced the hypothesis that the "reservoir of infection" may be found in certain tribes of monkeys and bases his belief upon the fact that in certain localities, prior to an outbreak of yellow fever, monkeys of the "red howler" (*Myctes seniculus*) tribe have been found dead or dying in the near-by forests, exhibiting suspicious symptoms. Manson has previously alluded to some of the lower animals as possible factors in the continuance of spread of the affection. It has been shown that yellow fever is endemic only in regions where monkeys abound. Assuming this theory to be correct and that the monkey is the animal which harbors the causative factor permanently, the course to be pursued is obvious.

Work along this particular line may yield invaluable information and may, in fact, lead to the ultimate discovery of this long-elusive germ, or whatever it may prove to be, thus rendering the eradication of yellow fever absolute and lasting.

SOME OBSERVATIONS ON THE EXAMINATION OF RECRUITS.

By J. J. A. McMULLIN, Passed Assistant Surgeon, United States Navy.

During the past 12 months I have had an opportunity to examine 1,871 applicants for admission to the Navy. There has been nothing during this experience which has impressed me so much as the fact that there are few things on earth more interesting than a normal man, except an abnormal man. Trying to decide between the normal and abnormal is a task by no means entirely devoid of difficulties. Conditions which can be diagnosed by inspection, such as flat feet, defective teeth, curvature of spine, hydrocele, hemorrhoids, etc., are impressive because we learn more from our eyes than from other senses. Indeed, it is an admitted fact that our ability to learn from the other senses suffers because we depend too much upon sight. Blind individuals usually have a much keener sense of touch and hearing because they have been compelled to develop other faculties highly, to compensate for their loss of sight. It seems most profitable, therefore, to consider briefly some phases of two conditions which can not usually be diagnosed by inspection alone, viz., defective lungs and defective minds. The diagnosis of defective lungs and defective minds requires the use of every sense, including "common sense."

The medical recruiting officer does not have the microscope or any refined laboratory methods to help him make up his mind. The applicant is ushered into the office and the medical examiner is called upon to decide. There is at once opened up a splendid opportunity to inflict an injustice on the naval service or the recruit. The applicant is not offered for prolonged study. There is no reliable history obtainable. After the usual display of the maneuvers generally executed in the name of physical diagnosis (of which inspection plays the largest part), abnormal conditions not made apparent by the methods employed are conceded not to exist. If there is any moral to be drawn from these assertions, it is that the medical examiner is compelled, for the time being, at least, to be somewhat of an old-fashioned doctor, who does not depend upon either laboratory methods or exploratory incisions to make his diagnoses, and the natural corollary is that too much should not be expected from him.

DEFECTIVE LUNGS.—Some of us hear abnormalities every time we apply the stethoscope to the chest; others are so oblivious to unusual sounds that murmurs or râles would not be heard if they were as

loud as the roar of Niagara. It is therefore natural that one individual's idea of what constitutes normal breath sounds may differ from another's. Admitting this to be a fact, I have the temerity to disagree with those clinicians who state, without qualification, that inspiration is longer than expiration. • In my opinion it is quite impossible to detect any constantly marked inequality in the time occupied in inspiration and expiration in broncho-vesicular breathing by auscultation. The physiologists, who have more nearly approximated by nicer means the exact respiratory ratio, support this assertion. From pneumatograms Brubaker in his latest work on physiology draws the following conclusions: "It is apparent that inspiration takes place more abruptly and occupies a shorter period of time than expiration; that expiration immediately follows inspiration, but there is a slight pause between the end of expiration and the beginning of inspiration. The time relations of the two movements can be obtained by an electrical current interrupted once a second. The ratio of inspiration to expiration has been represented as 5 to 6 or 6 to 8." It seems evident that in bronchial breathing expiration is distinctly prolonged, and exceeds inspiration in intensity and pitch; that the opposite is true in vesicular breathing, except that the difference in time is more apparent than real; and that in broncho-vesicular breathing inspiration and expiration appear to be equal in all respects, with a tendency to a slight increase in duration, intensity, and pitch of expiration. What do the textbooks mean when they state that expiration is prolonged in phthisis? Do they mean to convey the impression that expiration is not normally prolonged in bronchial breathing and in the respiratory act taken as a whole? The simple truth that we all realize is that areas of the lungs where vesicular breathing is normally heard give the signs of bronchial breathing, with the consequent evident increase in the intensity and pitch of all respiratory sounds, and in addition a prolongation of expiration.

It is generally conceded that vesicular breath sounds are transmitted better at the right apex than at the left. This is undoubtedly true in the great majority of applicants, but there are so many apparently normal men whose breath sounds are transmitted better at the left apex than at the right that I regard this exception to the general rule as something of no practical importance in the absence of other signs and symptoms. A left bronchus somewhat shorter in length and greater in diameter, or an anomalous distribution of blood vessels, might account for this phenomenon. It might also indicate the site of a healed tuberculous infection at the left apex, or simply weak breathing and insufficient expansion at the right apex.

Fully 50 per cent of the applicants show a temperature ranging from 99 to 99.6°. Such applicants should not be condemned on the

theory that they may be in the early stages of tuberculosis or some other communicable disease. The cause for this elevation of temperature is frequently not definitely known. I have noticed that the temperature of some of the men does not rise until after they undress, leading me to believe that the cooling of the body following undressing has caused the body to react in such a way that the mechanism of heat production becomes overzealous in its effort to bring the temperature back to normal. The cooling stimulates oxidation, and muscular exercise and nervousness act as contributing causes.

When the physical examination shows no tangible evidence of tuberculosis, but there are present signs of general bronchitis, I believe the applicant should, as a general rule, be rejected and told to return in two weeks. It is evident that some desirable recruits will be lost to the service in this way, but they are sacrificed for a good cause. If the signs of bronchitis are mild and the applicant has a sturdy physique, does not show any elevation of temperature, rapidity of pulse, excessive dripping of perspiration from the axilla, can hold his breath 35 seconds, and gives a negative history, I think it safe to disregard the signs of bronchitis as a cause for rejection.

It may seem elementary to draw attention to the fact that pulmonary resonance on the right side posteriorly descends quite as low as it does on the left and is not materially modified by the liver. I recently saw, in company with a visiting chief, a hospital patient who was thought to have either an abscess of the brain or spinal meningitis, the internes disagreeing to that extent. Physical examination showed signs of lobar pneumonia, involving part of the right lower lobe. The temperature was 106°, respiration 40; Kernig's sign was present. The dullness caused by consolidation was attributed to the liver, the abnormal breathing to the fever, vomiting and some nervous symptoms, including nystagmus, to the infection in or around the central nervous system. The clinical diagnosis of meningitis or abscess of the brain was disproved the following day when the autopsy report showed the cause of death to be lobar pneumonia affecting the right lower lobe. This case is cited in order to emphasize the elementary but frequently forgotten fact that liver dullness does not materially modify the pulmonary sounds heard over the lower lobe of the right lung posteriorly.

Acromial auscultation has been tried at this station and abandoned. The physical signs of any given pulmonary condition were heard better, and certainly localized better, over the site affected, rather than over some distant bony prominence.

Tuberculin tests were not tried. Comparatively few recruits would pass if it were required that they should respond negatively. The

personnel of the Navy would be considerably reduced if every man now in the service responding positively were surveyed.

It is always difficult to obtain any reliable information from the applicant. If the examiner thinks it worth while to ask any questions, they should be put after instead of before the physical examination. If the signs of bronchitis are present, the examiner should not say "Have you a cough?" but rather "How long have you had a cold on your chest?" The applicant then usually makes a statement in which it is to his material advantage to more or less curtail the actual period of the existence of the cough. However, having admitted this much, he often gives a history of maternal or paternal tuberculosis, night sweats, hemoptysis, and other important information which should count a little more in favor of tuberculosis than the same information coming from a patient applying for relief.

DEFECTIVE MINDS.—During the spring of 1912, while temporarily attached to the naval prison, Portsmouth, N. H., I applied a modification of the Binet test to some of the prisoners, and was surprised to find that the majority of those examined seemed to be defective. The number of men examined at that time was not large, and therefore the conclusions may have been erroneous. However, it appeared that a large proportion of the inmates of the institution were mentally defective, and that some of them might have been excluded from the service, if appropriate tests had been applied at the recruiting station.

Among the large number who apply at the recruiting stations there are certain to be many who are grossly defective mentally, men who are unable to make their way in the world and who flee to the Navy as a haven of last resort. These men deserve attention, but the Navy is not an eleemosynary institution, and is decidedly not the proper place to train or attempt to improve their condition.

In all men are the primal instincts of self-preservation and the propagation of their kind. In the defective these animal traits are more strongly developed and not under control. If the defective is too stupid to earn a living by honest means he will find it quite natural to resort to dishonest practices, and goaded on by the instinct of self-preservation he will find it necessary to lie, cheat, or steal, disregarding moral or ethical restraints. Obedience to the uncontrolled instinct of propagation leads him to promiscuous sexual indulgences and various types of perversion.

It is not at all likely that men who are defective mentally have a monopoly on all that is bad and reprehensible, but they have more than their share of evil inclination and less than their share of self-control. They should be regarded as potential offenders against established laws, and condemned at the recruiting stations before they have an opportunity to prove themselves guilty. It is likely that

some acceptable recruits would be sacrificed, but such a sacrifice would be justifiable.

Only the grossest types of insanity can be discovered during a short examination conducted by one untrained in psychiatry. There are inferior types of men who will pass any standard set of tests. I know alienists who find it necessary to study certain cases six months before giving an opinion. Therefore the tests based on the Binet method can only help to solve the problem of ridding the Navy of undesirables. They will partially succeed in eliminating a large number of applicants who are not actually insane, but who would prove to be incompetent and troublesome if admitted to the service. A study of the mental condition of recruits, carried on for several months at the training stations by medical officers experienced in this line of work, should supplement any test which seems adaptable to recruiting stations.

In estimating the value of tests for the detection of defective minds we should bear in mind the pertinent fact that there are physical defects which are not discovered by our standard method of physical diagnosis. An incomplete examination is better than none; it is too much to expect any test to be unfailing in its results. Different examiners will obtain different results, even as they obtain different results in physical and chemical examinations.

The following examination is applied to applicants at this station :

1. Applicant repeats three sets of numbers, each set composed of seven digits.
2. Composes sentence containing three such words as Buffalo, money, river.
3. Gives differences between the president of a republic and a king, or defines two abstract words.
4. Gives the opposite word to good, outside, tall, big, loud, white, light, happy, false.
5. Interprets code mcoe licqkuy (come quickly).
6. Draws two simple designs from memory after inspecting for 10 seconds.

An average of 70 per cent is required to qualify. Perhaps a minimum average of 75 per cent would be a better standard. By way of control, this test was applied to 10 enlisted men on duty in Buffalo, all of whom passed with high averages.

Two hundred applicants recently took this examination and 34 failed. In this series only two applicants were rejected because of their mental condition alone; the others who failed had some disqualifying physical defect, and the mental condition was named as a contributing cause for rejection.

EXPERIENCE OF A SURGEON DURING THE OCCUPATION OF VERA CRUZ.

By GEORGE TULLY VAUGHAN, Assistant Surgeon, Medical Reserve Corps, United States Navy.

When the news reached Washington on April 21 of the fighting in Vera Cruz it occurred to me that the very efficient, as far as quality goes, Medical Corps of the Navy might need the assistance of some of the officers on the reserve list; therefore the next morning, April 22, I tendered my services to the Surgeon General. I was directed to proceed to Vera Cruz and to report to the commander in chief of the Atlantic Fleet for duty as operating surgeon on shore or in the fleet, as the Admiral might decide, and left for Philadelphia, boarding the *Morro Castle*, bound for Vera Cruz, April 23, having on board the Third Regiment of Marines, under command of Col. Franklin J. Moses. For the colonel and one of the captains of the regiment, Owen, this was destined to be the last trip, as both died in Vera Cruz, one of pneumonia, the other of dysentery.

On reaching Vera Cruz, April 29, I was assigned to duty ashore as chief operating surgeon of the field hospital of the First Brigade of Marines. This hospital was intended for the care and treatment of patients who were too seriously sick or injured to be treated at their regimental dispensaries and was to accompany the brigade in case of advance into the interior, and in the meantime while stationary was to act as brigade hospital. So in its organization the brigade surgeon, Surg. D. N. Carpenter, United States Navy, was careful to select such supplies and equipment for the hospital as would best combine efficiency, economy, and lightness, in order to interfere as little as possible with its mobility. A schoolhouse consisting of four long, wide rooms was chosen, the furniture removed, and the hospital equipment installed. Each room had just outside of the end a toilet with supply of water. One of the rooms was divided into two by a tarpaulin curtain which could be raised or lowered; the front half was used for the office and the back half for the operating room. Part of another room was used for the mess room for the hospital corpsmen and such patients as could go to the table, while at the back part just outside a small kitchen was constructed. Two entire rooms were left in which cots were placed for patients, one room for surgical and the other for medical cases, and when more room was needed the front part of the mess room was used. The capacity of the hospital was 40 to 45 beds or cots. All the doors and windows were screened and electric fans were used in the wards, day and night, on account of the heat. For surgical operations the material was sterilized in a small sterilizer and iodine and alcohol were chiefly used as disinfectants.

The hospital corpsmen were 2 stewards and 13 apprentices. With this comparatively primitive surgical outfit 66 major operations were done by Dr. Carpenter and myself, besides a number of minor ones, without a death, including such operations as appendectomy, cholecystectomy, thoracotomy, herniotomy, etc. In fact, it is not too much to say that the results were as good and the operations as free from infection as in any thoroughly equipped hospital. Ether for general and cocain for local anesthesia were the anesthetics used almost without exception. No difficulty was found in the administration of ether on account of the high temperature. The ether was usually administered by Asst. Surg. Cornett, but sometimes by one of the hospital stewards, Youngkin. A few cases of gunshot wounds were treated. One of interest was of the acromial region, in which the patient was wounded at target practice at a distance of between 500 and 1,000 yards, the ball striking the shoulder about 3 inches posterior to the tip of the acromion process and emerging just beyond the tip of the acromion over the origin of the deltoid muscle. The point of entrance was small and of usual size, while the wound of exit was very large, the skin being lacerated and retracted, leaving a wound 3 inches in diameter. Whether this was an explosive effect or the result of change in axis of the bullet from a longitudinal to a transverse direction it is difficult to say.

The work of the medical officers of the Navy during the two days of fighting in attending the wounded, often under fire, and their sanitary work afterwards in camp and hospital was most excellent and deserving of all praise.

EXPERIENCES WITH MARINE EXPEDITIONARY FORCE IN MEXICO.¹

By R. M. LITTLE, Assistant Surgeon, Medical Reserve Corps, United States Navy.

The following article has been prepared with the idea of presenting to my fellow members of the Medical Reserve Corps of the Navy a practical idea of what the receipt of orders detailing to active service involves, and some few of the experiences noted by a practitioner suddenly called into the unfamiliar surroundings of a military life.

On the afternoon of April 21, 1914, I received a telephone message requesting me to come to the Bureau of Medicine and Surgery of the Navy Department. Here I was informed that a marine expeditionary force was being organized, and was asked if I could be ready to join it at once. I had made a request for active service some time before. On April 22 I received telegraphic orders: "Proceed immediately Philadelphia, Pa.; report commanding officer, and when directed by him to commanding officer marine expeditionary force

¹ Read before the Medical Society of the District of Columbia, Nov. 25, 1914.

sailing on board the *Morro Castle* for duty with that force. (Signed) Victor Blue." According to United States Navy Regulations, if orders read "immediately" an officer shall leave within 12 hours of their receipt. I left Washington at 3, arriving at Philadelphia at 6. I telephoned the commandant of the Philadelphia Navy Yard, and was informed that I could report the next morning at 10, and that I might go aboard the *Morro Castle* that night. I had very little time to be advised about my personal equipment, and carried a number of useless things and left out some of the necessities.

I found the following articles sufficient: One suit civilian clothes, one suit uniform (blue), two suits uniform' (white), including white cap and white shoes; three pairs khaki riding breeches, two khaki blouses, three flannel shirts, one pair tan shoes, one pair puttees, half dozen suits underwear and socks, a campaign hat, hat cord, bronze buttons and corps device, bedding roll, blankets, pillow and clothing roll.¹

The Third Regiment was composed of barrack detachments and prison guards from all the stations along the Atlantic coast from Portsmouth, N. H., to Port Royal, S. C. They began to arrive on the morning of April 23. The officers were assigned their rooms on the *Morro Castle* by the regimental quartermaster. I reported to the commandant of the navy yard, had my orders endorsed, then went to the paymaster and drew my mileage. Returning to the ship I reported to the regimental surgeon and assisted in supervising the loading of the medical stores. After loading all the stores the men embarked and the ship left the dock at 4.30 p. m. I thought this was rapid work to assemble a regiment of 850 men that was so scattered and load the ship with stores for three months in so short a time.

As soon as we were under way ship routine was established, sick call being at 9 o'clock. It was taken alternately by the battalion medical officers. We had few cases of seasickness, as the weather was fine. We treated a number of cases of minor injuries incurred while loading stores. One case of acute appendicitis we put ashore at Key West. Drills and instruction were given every day. There was officers' school each morning for the study of Spanish. The regimental surgeon gave the company officers instruction in first aid and camp sanitation. After we were out two days the men were all

¹ 1847. Naval officers and men serving with an expeditionary force of marines may wear the field uniform prescribed for officers and enlisted men of the Marine Corps, respectively, substituting naval insignia for those of the Marine Corps. (Art. 55 (b); Uniform Regulations, 1913.) The following allowance of baggage is prescribed for officers ordered on expeditionary duty with marines: All officers: Bedding and clothing roll (mounted officers, in addition, horse equipment); field officers, 2 steamer trunks. No trunk shall be taken whose cubic contents is more than 5 feet. Officers will provide themselves with the standard Army trunk, dimensions, 31 by 17 by 14 inches. (Headquarters, U. S. Marine Corps, Aug. 9, 1913.)—Manual for the Medical Department.

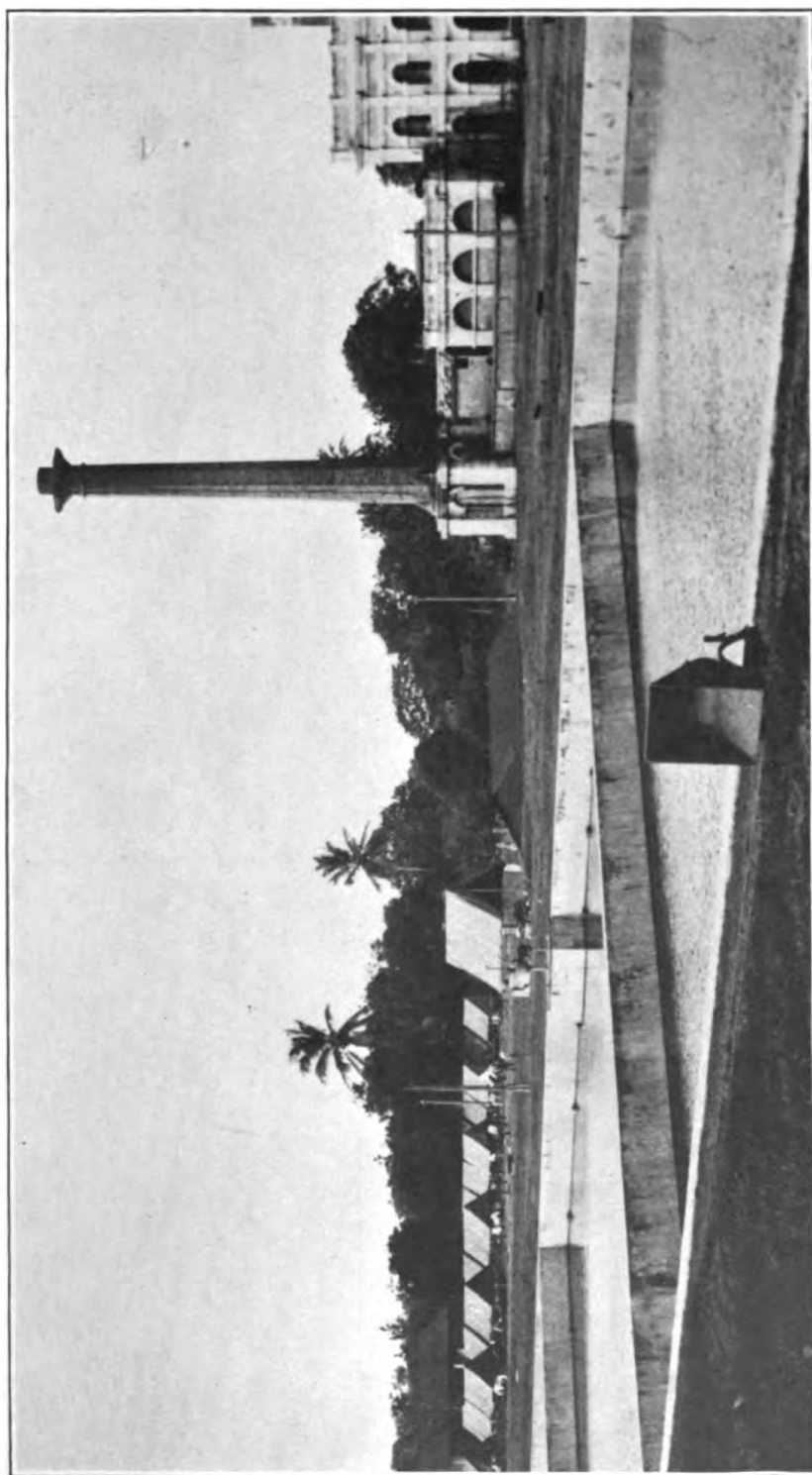
inspected. All not having a recent successful vaccination were vaccinated. A record of cases not having had typhoid prophylaxis was made. The latter was given when we went into camp.

We arrived at Vera Cruz April 28, about the beginning of the rainy season. The next morning I received the following communication: "Subject: Orders. 1. You will report to Maj. John H. Russell, Marine Corps, commanding the Second Battalion, at once: for duty on detached service with the battalion under his command. 2. You will be accompanied by a hospital steward and three apprentices who will report to you for duty. By order of Col. Moses." The Second Battalion, consisting of the Twenty-second and Twenty-third Companies, disembarked, entrained with ammunition and stores, and went into camp at El Tejar. Later we were joined by the First Company of the Artillery Battalion and the Twenty-first Company of the Second Battalion, making a total of 500 officers and men.

El Tejar is situated on the Jamapa River 9 miles from Vera Cruz. There is a narrow-gauge railway connecting it with the city. The pumping station and filtration plant for the water supply are located here. Owing to the nature of the duty in guarding the water supply, the camp was selected to be central as well as sanitary. The country is open and level, the soil sandy and well drained. We received our water from mains supplying the city. Before the rainy season was well advanced we had a fine bathing beach in the river below the intake for the pumping station. The water was clear, the course rapid, and the bottom covered with fine black sand; as the season advanced the water became muddy and the current too rapid for safe bathing. We had shower baths in the camp.

The galleys were located near the water outlets and were kept well drained. As they were not floored, the ground was sprinkled with crude oil to keep down the dust and prevent the presence of flies. Later, when material was available, they were screened. All refuse from the galleys was buried at some distance from camp. Afterwards permission was given by the brigade sanitary inspector to dump this waste in the river below the ford. This work was done by a detail in charge of the police sergeant. Incinerators were not used owing to the lack of wood. Latrines were dug 18 feet long, 5 feet deep, and 18 inches wide, one for each company. They were located close to camp so that it was not necessary to use night cans. By burning them out daily with crude oil and hay there was no annoyance from flies, or odor. This was done by detail under the supervision of a hospital apprentice. Later when we could get the lumber, in order to establish an absolutely sanitary condition, box covers were made. The frames were made of 2 by 4 inch, covered by boards 1 by 6 inch. The top was hinged so that it could be opened when the trench was burned out. The seats were cut in the top, 18

Little—Marine Expeditionary Force.



International New Service.

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FIG. 1.—MARINE CAMP AND PUMPING STATION AT EL TEJAR.

Little—Marine Expeditionary Force.



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International News Service. FIG. 2.—CLEARING THE GROUND NEAR EL TEJAR WATERWORKS.

inches apart, and had close-fitting covers that were made to fall into place when not in use.

No horses were permitted in camp. The manure from the corral and picket lines was carted a mile from camp.

There was difficulty in keeping dogs out of camp, but this should be done, as there is always a risk of rabies.

Owing to the presence of smallpox in the vicinity, every one in camp was vaccinated, a large percentage being successful. The natives having this disease were sent to the *lazaretto* and all others vaccinated. Of the 15 men given the typhoid prophylaxis only 1 showed any reaction. He had a temperature of 102° F. for 24 hours. He had had typhoid fever three years before, and the vaccine was given at his request. The men were not permitted to carry food to their tents, nor did we allow the use of native milk, fruit without skins, or uncooked vegetables. Cots and blankets were aired once a week. Tents were struck once a month.

We had few ~~flies~~ or mosquitoes in camp, but the mosquitoes and ticks were very troublesome on the outposts. At the Marino Bridge, about 2 miles from camp, they were very bad. The men experienced most relief from the use of the oil of citronella. In camp the men slept under nets. There was a daily sanitary inspection of the camp. The men were inspected once a week. I had a hospital steward and five apprentices. Only one, an apprentice, had been in camp before. One apprentice was detailed with the outpost at the Marino Bridge, a detachment of 20 men, who were relieved every 5 days. All other outposts were relieved every 24 hours. Two apprentices were detailed to supervise the burning of the latrines and the oiling of any pools that we were unable to drain. At a call to quarters the marines went to the trenches; one apprentice was with each company. The hospital steward remained with me at the dressing station. Apprentices were given daily instruction for one hour in first-aid care and transportation of wounded and bandaging. We had two hospital tents, one used by the apprentices, the other we used as sick bay, and was occupied by the hospital steward. We had company outfits, medical and surgical, and drew on the regimental store for such medicines and dressings as we needed for daily use. We had a complete microscopical outfit. We had a few cases of malaria, the majority giving a history of a previous attack. It was a mild type and yielded readily to treatment. There was one case of measles. The patient with all his gear was isolated in a tent. Another tent was given the apprentice detailed to care for him. The patient made a good recovery, but his convalescence was slow. His tent-mates were quarantined for 15 days. During our stay in camp our complement averaged 441.

The sick rate was 0.5 per cent. Seven cases of venereal disease were admitted, making the ratio 18 plus per thousand. The low percentage of sick considering the arduous duties of digging trenches, cutting trees, building defenses, etc., reflects credit on the officers and men in the care of themselves and the strict observation of the sanitary regulations.

THE TREATMENT OF CHRONIC POSTERIOR URETHRITIS.

By G. T. SMITH, Medical Inspector, United States Navy.

It is always a source of gratification to the urologist to be able to discharge, as cured, the patient who has been suffering for months and perhaps years with that persistent "morning drop" of pus due to a chronic gonococcus infection of his deep urethra. He comes, having run the gamut of the quacks and druggists, and we find his mental condition often as serious as the disease from which he suffers.

Now, the great majority of these cases can be cured by the physician who has specialized in this branch of the healing art, for it is next to impossible for the busy general practitioner to devote the necessary time and pains to diagnose and treat them.

In the first place, having obtained a full history of the case, the discharge from the urethra should be caught on a slide and examined microscopically for pus, epithelium, and the gonococcus. This examination should be frequently repeated during the course of treatment. Next the patient's urine is examined by the usual five-glass test and the specimen kept for chemical and microscopical examination. The patient should then be examined under strict asepsis on the operating table for stricture of the urethra, infected glands, erosions, folliculitis, etc., by means of bougies, sounds, and urethroscope. Next the prostate and vesicles should be examined by the trained finger per rectum and any discharge expressed from the urethra caught on a slide for microscopical examination. A full record of all these examinations should be kept as soon as practicable after making them.

The patient now having been cautioned that a cure can not be obtained without his full cooperation—which, briefly, consists in absolute abstinence from alcohol, venery, overeating, automobile, bicycle, motorcycle, or horseback riding, and dancing—is directed to return the next day for the beginning of the local treatment. By that time, in nearly every case, the physician will have arrived at the correct diagnosis, and will be prepared to give the appropriate treatment.

I will only take up the treatment of chronic posterior urethritis with freedom from stricture and with no involvement of the prostate gland or seminal vesicles. As a rule I prescribe in these cases

hexamethylenamin in 10-grain doses three times a day with a full glass of water.

My sheet anchors in the local treatment of this disease are the nitrate of silver and a 2 per cent solution of formaldehyd (40 per cent) in glycerine. None of the expensive and much-vaunted organic preparations of silver, such as argyrol, protargol, etc., can compare in my experience with the nitrate of silver, but it must be used in the proper strength, at the proper time, and in the proper place to demonstrate its excellence. It is best applied by means of the deep urethral syringe or by the urethroscope. I begin with a 1 per cent aqueous solution, freshly made, and cautiously increase the strength at each sitting, up to the individual's tolerance. This varies greatly in different persons. It should produce merely a sensation of warmth in the perineum, but no pain. It is best applied every other day and always after the patient has emptied his bladder.

The formaldehyd and glycerine solution is administered by the deep urethral syringe and does not produce pain. I find that, as a rule, the nitrate of silver acts best when gonococci are found in the urethral discharge and the formaldehyd solution best when no gonococci can be found.

The urine should be examined at each visit by the three-glass test and it is almost needless for me to state that all instrumentation of the urethra should be conducted with the utmost gentleness and with rigid asepsis.

A NEW METHOD OF EXAMINING STOOLS FOR EGGS.

By C. M. FAUNTLEROY, Passed Assistant Surgeon, Public Health Service, and R. HAYDEN, Passed Assistant Surgeon, United States Navy.

The following is a description of what is to us a new method of examining stools for eggs of the different varieties of worms. It consists essentially of staining the fecal matter with aniline gentian violet. This solution stains everything on the slide except the eggs. It does not penetrate the membrane about the eggs and they are therefore left in a natural state. None of the other ordinary colored stains will do this. These others are practically all alcoholic solutions, penetrate the egg membrane, and as a result the eggs, as well as the surrounding field, are stained. By staining with the aniline gentian violet one is enabled to run quickly through a slide with the certainty that he is not overlooking any eggs. Nor does he have to stop to examine objects which closely resemble eggs, but in reality are not. The entire slide with the exception of the real eggs is stained violet. In addition to facilitating the search for the eggs the violet color is soft and pleasing to the eye.

This method of examination has been used by us in the examination of over a thousand stools with uniform success. All eggs, hook-worm and others, stand out very clearly and beautifully. One can hardly realize how very much easier it makes fecal examinations, especially in large numbers, until he has tried it himself. The lysol mentioned in the technique is not necessary, it being added merely as a disinfectant. This method is so simple that the preparation of the slides may readily be left to an assistant.

METHOD OF PREPARATION OF MICROSCOPIC SPECIMENS.

1. About 2 grams of the fecal material will be thoroughly mixed with 5 cubic centimeters of 2 per cent aqueous solution of lysol in a centrifuge tube.

2. The specimens will be centrifugalized at high speed for one minute, the supernatant liquid will then be decanted and fresh lysol solution added and mixed with the sediment in the tubes. This operation will be repeated three times.

3. Upon completion of the centrifugalization process a small portion of the bottom sediment will be removed with a clean pipette and placed upon a clean slide, a small drop of aniline gentian violet mixed with the sediment, and a clean cover glass placed upon it.

AN ACCOUNT OF THE YELLOW FEVER WHICH PREVAILED ON BOARD THE UNITED STATES SHIP "JAMESTOWN" IN 1866-67 AT PANAMA, AS TOLD BY DELAVAN BLOODGOOD, A. M., M. D., SURGEON, UNITED STATES NAVY.

A tribute to the memory of the members of the medical department of that vessel.

By W. M. KERR, Passed Assistant Surgeon, United States Navy.

Pestilence and calamities which from time to time are visited upon mankind are not long remembered by the children of men. The volcano belches forth fire and ashes and buries the city at its base, but in a few years another takes its place, and its inhabitants go about their daily labors unmindful of the danger which towers above them; the earthquake causes the works of men to tumble, but they are soon rebuilt and the lost forgotten; the tidal wave sweeps up the river and destroys thousands of habitations and the dwellers within, yet a few years see the river banks repopulated by a busy throng unmindful of the fact that what the river once did it may do again; smallpox, plague, and cholera have swept over vast areas, but the detailed story of the destruction and desolation caused by them soon passed from memory.

There was a time not many decades ago, when the approach of yellow fever caused terror to spread throughout the Southland. The disease meant not only death, but a quarantine which stopped all traffic. It meant cities and towns shut in upon themselves—a veritable commercial strangulation. It meant railroad yards piled high with freight and steamship docks blocked with accumulated shipments—perishable goods rotting on the piers and in the yards. It meant universal distrust and dismay, hunger and want, terror, and panic. Business was abandoned, houses deserted, and men and women fled from the dreadful ravages of the disease, often only to be brought to a standstill by the shotgun quarantine of neighboring communities, and sometimes to die of starvation and exposure while camping on the highlands, and praying for the first frost to come. From the endemic areas of the West Indies, South and Central America, and the Isthmus of Panama the fever came; and up to the time of the brilliant researches of the yellow fever commission men were powerless to stop its ravages until the approaching winter came to their aid.

The great epidemics of yellow fever which affected the Southern States brought to light many a hero whose name and deeds are now forgotten. Incidents are recorded of physicians and nurses remaining faithful to duty until they fell exhausted from fatigue or were claimed by the disease they so valiantly fought, while those about them fled to safety. Medical officers of the Army, Navy, and Marine Hospital Service, as well as civilian volunteers from the North rendered brave and distinguished service to the stricken communities. It is almost a self-evident truth that one who has the moral courage to remain fighting a dread disease in a panic-stricken community will learn much about it; therefore it is not strange that some of those who remained in the fever-infested areas, and some who came from a distance to render what aid they could, should have left to posterity vivid clinical accounts of yellow fever.

They pictured a disease of short duration, divisible into two paroxysms which are separated by a remission or an intermission. The first paroxysm is characterized by headache, flushed face, injected eyes, pains in the body, and generally after the second day, albuminuria; while the second paroxysm shows the jaundice from which the disease obtains its name, and the hemorrhages of which black vomit and black bowel evacuations form such ominous signs.

In yellow fever prodromata are usually absent. The attack begins with a sensation of coldness, with or without chills, and a severe frontal headache, pains in the back and limbs, while the face, at first pale, becomes flushed, the skin congested, the eyes brilliant and injected. Photophobia is often present. The temperature rapidly rises to 103° F. or even higher; the respiration quickens.

and is labored; the pulse is quick, full, and bounding. Appetite is lost and there is usually vomiting, associated with pain and tenderness in the region of the pylorus. The urine is generally diminished, acid in reaction, with a high specific gravity, and shows the early presence of albumin.

On the second to fourth day, the intermission or remission sets in, the temperature either dropping by crisis accompanied by sweating, to normal or remitting to about 100° F., the flush and pains disappearing. In the former case the disease ends and convalescence begins. More usually, however, after a few hours remission, during which the patient feels much better and sleeps well, the temperature again rises to 104° F. or more; but a most characteristic feature first described by Faget, now shows itself in that the pulse does not increase in rapidity as the temperature rises. On the contrary, as the disease progresses, the pulse rate tends to become slower, without regard to the temperature. The presence of this sign depends upon the severity of the case, being most evident in the severe types, in which the pulse rate may be only 60 to 70 per minute, though associated with a high temperature.

During the second paroxysm all the symptoms of the first attack return, but the congestion of the skin is not so marked and the yellow tint of jaundice appears for the first time and increases as the case proceeds. The vomiting and tenderness in the stomach return and are associated with great thirst and prostration. The tongue is dry and furred, with red tip and edges. Hemorrhage may now occur from the nose or mouth and black vomit or black bowel movements may appear. The urine decreases in quantity, while the albumin increases. In bad cases there may be complete suppression of urine. There is generally much restlessness and often delirium.

When this stage is reached two outcomes are possible. The first is that after three or four days of illness the temperature may decline, the urine increase in amount, the albumin diminish, and the vomiting gradually cease, while sweating may occur, and the patient, passing into a deep sleep, awakens on the road to recovery. The second is that the temperature fails to decline, the jaundice deepens, hemorrhages appear under the skin and from the mucous membranes, and hiccough, subsultus tendinum, cold sweats, anuria, coma, and convulsions lead to a fatal termination.

Three varieties of yellow fever were generally described, the mild, the severe, and the malignant. The mild type consists simply of the first paroxysm in which the temperature is slight, the urine contains albumin, and the temperature subsides by crisis on the second or third day. The severe type is marked by the characteristics given above as typical of the disease. The malignant type begins with high fever, with violent vomiting, and the early appearance of black

vomit and black bowel evacuations. The patient quickly becomes delirious and the disease ends fatally during the initial paroxysm.

Pathologists working during the later epidemics and in endemic areas showed that in yellow fever the cells of the liver swell and by pressing upon the bile capillaries obstruct the flow of bile and cause a hepatogenous jaundice, characterized by yellow staining of the skin and tissues and by the presence of bile in the urine. This swelling of the liver cells also blocks the intralobular capillaries, causing congestion of all the viscera drained by the portal vein, but especially the pyloric end of the stomach and duodenum because of the arrangement of the veins from these parts; hence the vomiting and irritability of the stomach. Following the swelling the liver cells degenerate, and in severe cases so extensively as to cause the functions of the liver to be suspended, with resulting serious toxic effect on the brain, kidneys, and other organs. The kidneys show an acute parenchymatous degeneration, which accounts for the early and marked appearance of albumin. The disease also seriously affects the endothelial lining of the small blood vessels, thus producing hemorrhages in various portions of the body.

The vomit was described as white, red, and black. The white is colorless or bile stained and is composed principally of mucus. The red vomit contains bright red blood, while the black contains hydrochloric acid, epithelial cells, and debris, its color being due to the presence of hemoglobin changed to acid hematin by the acid.

The last and most important addition to our knowledge of yellow fever was acquired as a result of the brilliant researches of Reed, Carroll, Agramonte, and Lazear, who composed the yellow-fever commission. These men demonstrated that the disease is due to filterable virus and is transmitted only by the bite of an infected mosquito. They proved conclusively that if the mosquito *Stegomyia calopus* feeds upon those sick of yellow fever in the first 3 or 4 days of the disease it will become infected with the ultramicroscopic causative agent of the disease. They also observed that an interval of about 12 days from the time of feeding must elapse before the infected mosquito is capable of transmitting the disease to a nonimmune. The results of the investigations of the yellow-fever commission threw a new light upon the disease and opened the way to the eradication of yellow fever from its strongholds.

Yellow fever not only affected the dwellers on shore, but it spread to the shipping, and our Navy was not exempt from its visitations. The exigencies of the service demanded that naval vessels visit the endemic regions to the south, and it is not strange with the etiologic factor and its method of transmission unknown to the medical officers of those days that ships were often visited by the dreaded scourge.

During the four hundred odd years that the Isthmus of Panama has been used as a passage between the Atlantic and the Pacific "yellow jack" has taken dreadful toll. In the old days thousands of Spanish soldiers, priests, and merchants paid the penalty of the Tropics in crossing this way. Many a gold seeker in 1849 succumbed. There was a heavy death toll in the fifties when the Panama Railroad was built. In the eighties followed the awful mortality among the French canal builders and their imported laborers. It was not till Col. Gorgas arrived with the knowledge imparted to him by Reed and Carroll that the region was freed of the dread disease, and the American people were enabled to carry on the greatest engineering work of modern times.

The Panama Canal has been opened to the traffic of the nations of the world, and with the careful sanitation which ever must be maintained along its banks yellow fever and the results of its terrible visitations will soon be but a dim memory to the dwellers in the Canal Zone. Medical officers of naval and merchant vessels will pass from ocean to ocean with little thought of the disease, but it always will be there, lurking just beyond the outposts of sanitation, ever watchful for a moment of relaxed vigilance on the part of sanitary officers.

One of the most fatal outbreaks of yellow fever occurring in a ship of our Navy prevailed on the U. S. S. *Jamestown*, the hospital and store ship at Panama in 1866-67. The account of this epidemic is now remembered by but a few of the senior medical officers of the Navy, therefore it may bear repeating; and it certainly is worthy of preservation in the annals of the Naval Medical Corps.

The story now reposes in a musty volume of Medical Essays, compiled from reports by various medical officers of the Navy to the Bureau of Medicine and Surgery and published to the service in 1872. As told by Delavan Bloodgood, surgeon, United States Navy, it is extremely interesting in the light of present knowledge. It affords a glimpse of the distant days of sailing ships and long voyages, days when the ventilation, the food and water supply, and the means for caring for the sick were not of the best when judged by modern standards; days when men knew little of the diseases found in tropical regions, and when the recommendations of medical officers were sometimes disregarded with disastrous consequence. It gives a picture of a little group of men fighting death, a death which was ever ready to spring upon them from out of the great unknown; a death due to a disease which they believed never would be routed from the Isthmus of Panama.

The tale which Dr. Bloodgood left to posterity and which is best told in his own words is as follows:

"On board the United States store and hospital ship *Jamestown* in Panama Bay, December 19th, 1866, at midnight, William McSoley, private marine, was suddenly seized with pains in back, followed by great thirst and oppression in chest. The 21st he was very weak, unable to drill. The 22nd he had fever of an ugly character; says he feels as he did some years ago when he had severe typhoid fever; heat of skin very great; pulse rapid; tongue dry and red at tip and edges. On the 24th he was very much prostrated, and the 25th his prostration continued, with great pains in back. The 26th there was great intestinal irritation; mind wandering; delirious at night; and attempted to leave his cot. From the last date McSoley slowly convalesced. This patient has been employed as sentry at the naval storehouse in Panama from the 8th to the 19th of December, inclusive. I subsequently learned that irritability of the stomach was a constant symptom during the first few days of his illness, and that he had numerous black liquid dejections.

"Charles A. Gicquel, carpenter's mate, was seized during the night of December 30th with slight chilliness, followed by fever, which has continued ever since; fullness of head; soreness of limbs. These symptoms were attributed to a debauch on shore. The 31st his symptoms were regarded as those of inter. fever, and the next day, January 1st, 1867, as remittent fever; fever recurs at irregular intervals, attended with a good deal of nausea; tongue loaded. January 2nd, nausea was very distressing yesterday and last night and continuous to-day in a less degree. January 3rd, tongue coated yellow; eyes jaundiced; stomach so irritable as to reject almost everything; great thirst (the stomach symptoms the result of his debauch, no doubt). January 4th, stomach so irritable as to reject all nourishment; was delirious through the night. One o'clock p. m., Gicquel seems to be sinking; pulse very weak; passing into insensibility; refuses obstinately to allow any medicine to be given him. He died at half past 9 o'clock that evening, the fifth day from attack.

"Marcellus J. Maxwell, sergeant of marines, was admitted on the sick list January 10th, having had successive chills since last night; pain in the loins more than usually severe. The journal mentions for the following three days, continuous pain in back and soreness of flesh very severe; thirst; tongue coated, etc. Maxwell was discharged to duty February 2nd. I was afterward informed by him that he suffered from nausea and vomiting during the first few days of his illness, and that in convalescence his arms and body became yellow.

"January 12th. Edward George Joyce, corporal of marines, was admitted on the sick list with fever of as yet no definite character. The 13th it was called intermittent, and he was reported convalescent on the 14th, but 15th and 16th not so well; fever at night. The

17th there was return of fever; tongue very foul. The 19th int. fever had become continued; tongue red at tip and coated in middle; has diarrhea. No further remarks of moment are recorded, excepting that diarrhea was arrested and bronchial symptoms had developed, until the 23rd, when his condition was accounted critical from an unaccountable and exhaustive diarrhea. Joyce died at midday on the 24th, the twelfth day from attack. During the last thirty-six hours of his life, as I learned, vomitings were frequent, and his corpse turned yellow.

"On January 18th four men, who had just been released from the cells, dark and dank abysses of the orlop deck, were admitted and continued on the sick list five, twenty-three, twenty-six, and twenty-seven days, respectively. The records of their chills, pains, great prostration, etc., in connection with the foregoing and following cases are worthy of particular consideration.

"January 21st, Bernard Hagan, boatswain's mate, was admitted with intermittent fever; the 22nd he was charged with being drunk, and was disrated; on the 23rd was noted, has fever and diarrhea; the 24th, diarrhea and vomiting; 25th, violent retching yesterday, with hiccough, and at evening, vomiting violent, throwing up mucus and blood. Hagan died at 10 o'clock that night, having been sick four days.

"Edward Hanson, private marine, admitted at the same time with Hagan, had pains in back, debility, fever, diarrhea, hemorrhage from nose and mouth; but recovered, and was discharged from the sick list the eighteenth day after seizure. This man was associated with McSoley (the case first cited) as sentry at the storehouse on shore.

"January 23rd, Surgeon Marius Duvall, United States Navy, was attacked. Passed Assistant Surgeon F. L. Du Bois found him (24th) with high fever, intermittent type, result of climatic influences and exposure in walking a long distance over the reef in the midday heat of a tropical sun; 25th, there was persistent nausea and continued feeling of chilliness; the 26th, nausea continued, pain in scalp and ear; 27th, the same; 28th, passed a wretched night, retching and vomiting; very feeble and prostrate; has still eaten nothing; pulse 50; 29th, stomach still irritable, but passed a comfortable night by taking morphia; relished some champagne; 30th, conjunctiva quite yellow; nausea and vomiting; 31st, has fever and is flighty. February 1st, depression of spirits; his urine has stained his clothes deep yellow. Dr. Duvall left, per steamer of 1st of February, for New York, according to recommendation of board of survey. In order to prevent the spread of infection the articles used by Dr. Duvall were thrown overboard; the paint within a bathtub

in which he had urinated was turned completely black, so abnormal was the condition of his urine.

"January 25th, two days after Dr. Duvall's seizure, James Burns, private marine, and Michael J. Sweeney, landsman, were attacked. Burns had a hot but perspiring skin; pain in back; oppression in breathing; difficulty in swallowing; 26th, violent emesis; 27th, vomiting continued, with fullness in throat; eyeballs congested; 28th, the matters vomited were black, and he died the following day, the fifth of his illness. Sweeney started off with a chill, followed by emesis; pains in head, and conjunctiva congested; the 26th, he had vomiting and epistaxis; 27th, involuntary evacuations in cot; vomiting of blood and black matter. Death resulted the next day, the fourth day after seizure.

"Appended to the closing accounts of these two cases is the following: The congested conjunctiva, severe pains of back and head, choking sensation in throat, epigastric tenderness on pressure, with nausea, and finally the black vomit, like coffee grounds, render it almost certain that we have the yellow fever among us. It has lately been in Panama, but had disappeared. At present the city is very unhealthy.

"Following Burns and Sweeney, Thomas J. Ward, ordinary seaman, was attacked the day afterward. He had fever, nausea, vomiting, prostration, yellowness of skin, etc., but convalesced, and was discharged February 21st.

"The next day after Ward, William Devine, captain of the foretop, was seized. Vomiting of bile occurred the second day, of black matter the third; suppression of urine, insensibility, hiccough, and yellowness of skin succeeded, and death on the fifth day.

"John Dodd, private marine, who had been on the sick list the preceding one hundred days with syphilis, chronic rheumatism, and calculus, consecutively developed, on the 29th of January, well-marked symptoms of yellow fever, the chills, the fever, the nausea and vomiting, yellowness of skin, prostration, etc., but sustained it all and was discharged to duty March 25th.

"The next case in succession was that of Dennis Ryan, landsman. He had a congestive chill on the evening of January 29th. The usual severe symptoms supervened, delirium, black vomit, and death on the fourth of February, having been ill six days.

"February 2nd, John Hasson, captain of maintop, was admitted; and the pains, fever, chilliness, nausea, and congested eyes noted. February 3rd there was continuance of fever and nausea and epistaxis; is well salivated. February 4th yellow serum yielded from a blister over epigastrium; great nausea. February 5th he had convulsions, suppression of urine, vomiting, depression of spirits. Feb-

ruary 6th, hemorrhage from mouth. February 7th, hiccough, subsultus tendinum, strabismus, and death resulted the sixth day.

"In the night of February 8th Mr. John Adams, acting master, had a chill, followed by fever and pains in the head, limbs, and back. He took about fifteen grains of quinine each day until the 13th, when it was suspended on account of headache and soreness of throat; 14th, his conjunctiva was very yellow; 15th, the case regarded as quite mild; 16th, bronchitis supervened; 17th and 18th, improving; 19th, he was much troubled with cough and expectoration; 20th, very severe bronchitis, with expectoration of greenish mucus and great difficulty in throwing it off his chest; pulse very feeble; eyes more yellow; copious watery discharges from the bowels; 21st, breathing very rapid, secretions all operating save biliary; 22d, had five copious liquid stools; respiration loud and rapid; delirious; spat up blood. He died at 4 o'clock p. m. the thirteenth day and his corpse was yellow.

"Frederick W. Stevens, private marine, was admitted February 10th with intermittent fever, and was given a calomel purgative, and during the three following days five-grain doses of quinine *ter in die*. On the 14th nausea and the more marked symptoms of yellow fever presented, and these were duly followed by epistaxis, hemorrhages, etc., and by death on the morning of February 21st, the eleventh day.

"Thomas Smith, ordinary seaman, had a chill during the night of February 17th, which was followed by fever, and in the morning his eyes were much congested. February 19th, fever, eyeballs painful, slept none, bowels and kidneys acting freely. The next day black vomit set in, and he died that evening, the third day after seizure.

"Isaiah Marjerison, private marine, was seized before daylight February 27th with the usual chill, followed by fever. The second morning black vomit appeared, and next day there followed delirium, hiccough, and subsultus tendinum, all of which continued until suspended by death March 2nd.

"The cases of Paymaster John A. Bates, jr., United States Navy, and John Braumer, private marine, which developed simultaneously with Marjerison's, will be reverted to after the following necessary explanations:

"Under orders to the *Jamestown*, I sailed in the mail steamer from New York February 21st, 1867, reached Panama in the evening of March 1st, and went off to my duty soon after sunrise the next morning in the market boat. I found fourteen cases, five of them very critical, on the sick list, and that twelve deaths had already resulted from yellow fever. The same disease was prevailing on shore. Dr. Du Bois, whom I superseded as successor to Dr. Duvall, had on three

different occasions fumigated the ship, and had advised the commanding officer of the necessity for the removal of the vessel from that locality. I also proffered the unheeded advice that the ship should sail immediately for a cold climate, explaining that such a degree of local infection existed that there was no hope of the disappearance of the endemic fever while material remained for it to work upon. I recommended also that shore visiting be stopped, that the prisoners be removed from the cells, and that no one be permitted to sleep on the orlop or remain there longer than duty required. It is proper further to remark, in regarding the situation, that the *Jamestown*, newly commissioned, sailed from San Francisco in October, 1866, and reached her station in the middle of November, anchoring in the bay about three miles SSE. from the city of Panama, and about half a mile E. by N. from Flamenco, the largest of three precipitous and contiguous islands. Flamenco is unused excepting as a burial place, but the other two, Perico and Lleñas, are occupied by the Pacific Mail Steamship Company as depots for stores and coal, and for workshops and dwellings for the employees. Her arrival was just at the close of the rainy season, which commences in May, and during which the miasmatic exhalations are most manifest; when dampness and a greenish mold pervade everything; iron oxidizes with wonderful rapidity; furniture that is only fastened by glue falls to pieces; in short, the appearance and idea of disease are constantly impressed upon one. This period is usually inaugurated by showers which may last but an hour or two and not recur for three or four days; but as the season advances the rainstorms become intensified, till, delugelike, they continue from day to day, accompanied by thunder and lightning such as can only be experienced in the Tropics. The winds, which come mostly in squalls, are southerly, but they bring no cooling with them, only heaviness and oppression to the nervous system. Languor, lethargy, and loss of appetite are the immediate results, and fevers and diseases of the digestive apparatus the subsequent.

"This season had passed, for from the *Jamestown's* arrival, November 16th, until the end of the quarter and year 1866, but seven rainy days were logged. Calms and light variable winds prevailed, and the average daily temperature was (Fahrenheit) 78°.2 at 6 o'clock a. m., 84°.1 at noon, 81°.2 at 6 p. m., and 78°.5 at midnight.

"The *Jamestown* had been in port about a month when the first cases of yellow fever appeared on board. She was roomy and tidy, and well ventilated excepting her orlop, where the pestilence first made its manifestation among the marines and prisoners, who were billeted and kept there, and where also were the bag racks for the men; and as the clothing and bedding of the first three victims were

sold at auction to the crew, some of the infected articles must have been festering in that locality, which locality will again be called in question. The complement of officers and men numbered one hundred and eighteen, of whom four officers and three men had had yellow fever, and there were fourteen negroes, twenty-one persons in all who might be regarded as exempt from the danger. The report of sick for the fourth quarter, 1866, affords evidence of the general sanitary tone of the ship's company just previous to the outbreak of the fever. In those three months but thirty-six diseases had been treated, and of those were febris intermittens, one; febris remittens, three; febris continua, one; febris typhoides, one; diarrhea, two; dysentery, one; adynamia, one. The others were but trifling affections and injuries. McSoley's and Gicquel's diseases were included in the foregoing enumeration.

"Passed Assistant Surgeon Du Bois was detached ten days after I joined the *Jamestown*. Acting Assistant Surgeon E. T. T. Marsh, who preceded me aboard two days, remained a faithful and zealous coadjutor to the close of the scene.

"To resume the cases of February 27th: Paymaster Bates at first complained only of a dull headache, and was taciturn and somnolent. He had no chill, but fever came on at evening and continued through the night. He took a blue pill and had a hot foot bath at the hour of retiring. During the two following days he vomited frequently and became greatly prostrated. When I first arrived on board, March 2nd, his mind was clear, and he brightened up at seeing me, and was much interested in hearing of friends, and in his letters just received, but in less than an hour he became bewildered, black vomit was ejected, black liquid dejections were frequent, and prolonged sighing and hiccough set in. The surface of his body was cool. Surrounded him with bottles of hot water, applied sinapisms over abdomen and to extremities, and plied him with stimulants. Black vomit recurred three times during the day; after each act gave him, in mucilage, a few drops of chloroform in which an equal weight of camphor had been dissolved, and again small quantities of comp. spirits of ether with brandy; ice *ad libitum*. Throughout the night he was very restless and partially delirious. Gave him milk punch every hour, and the applications of warmth about the body were not relinquished. March 3rd, his hiccough was very distressing, prolonged, and so loud as to be heard all over the ship. Remedies which the day before mitigated it then were unavailing. Black vomit stools were frequent, and his pulse was scarcely perceptible at times, but would come up under extra stimulation. His stomach was quite tolerant to soup and brandy. Throughout the night delirium and jactitation were unintermitted. The applications of sinapisms and external heat were kept up, and stimulants given every twenty

minutes. March 4th, observed about his mouth and alae of nose and on forehead a peculiar vesicular and pustular eruption; his body was yellow and subsultus tendinum constant, and he was also muttering in a tremulous manner. At half past 10 o'clock a. m. he became quiet for a few minutes, looked up consciously, said good-by. and died. He had been sick five days.

"Braumer, attacked at the same time with Marjerison and Bates, was greatly terrified. The next day, February 28th, he had spasms and vomiting, and March 1st was very low. When I saw him (morning of March 2nd) he was suffering severe pain in the back, and I ordered dry cups along the spinal column, milk punch, and ice *ad libitum*; flying sinapisms and bottles of hot water to surround body. March 3rd he was very restless and tremulous; the treatment was continued as on day before; 4th of March he vomited occasionally, and his mind was wandering. In the afternoon black vomit appeared, he became delirious, and the secretion of urine was arrested. On the 5th of March hemorrhage from the mouth occurred, with soreness of throat; said that he would die before sunset. Throughout the night he was wildly delirious, shouting, singing, and occasionally hiccoughing and ejecting black vomit; the external heat was kept applied, and stimulants given freely. March 6th he slept some; stomach was quite tolerant, and he voided a little bright-yellow urine. March 7th he had rested well during the night; his mind was clear; no nausea; eyes less congested; urine voided; pulse 48. and feeble; he continued doing well until the 12th, when, obtaining some salts and senna surreptitiously, he physicked himself prodigiously, but finally recovered and was discharged to duty.

"March 1st Frederick Dallery, landsman, aged 19, had a chill, and there followed frontal headache, pain in back and limbs, suffused and pinkish eyes, which subsequently became yellowish, as did his body; bowels were constipated, tongue pasty, and pulse irregular. Nausea and great prostration occurred the second day, and continued during the two or three following. His urine was voided involuntarily, staining the blankets yellow. Treatment: Perspiration induced by hot mustard baths, purgative of calomel followed by oil, hot soups, ice *ad libitum* (and this for all patients); also gave him fifteen grains of quinine after catharsis. He was discharged to duty the 17th of March.

"While waiting on the beach the morning after my arrival I observed Mr. Charles A. Brown, mate, aged about 23, slowly advancing along the reef, frequently stopping to rest. He came up and went on board with me. He had passed the night at a hotel where many deaths had but recently occurred, and where, upon his arrival from San Francisco, five days previously, he had remained two days before reporting on board the *Jamestown*. He had had a chill during the

night, and the fever was then full upon him. As soon as we got on board he took fifteen grains of calomel, and was put into a hot mustard bath. But very slight diaphoresis followed. He was then given quinine, fifteen grains, and the employment of stimulants commenced. He became greatly prostrated and agitated, firmly convinced that he must die. On the 3rd of March he described a pain like a cord was tied tightly around his backbone. Nausea was constant, but he retained soup and stimulants. Sinapisms and bottles of hot water were employed, and he was given Hoffman's anodyne repeatedly. His neck first became yellow, and upon it and the face were a few vesicles, similar to those observed upon Mr. Bates. The secretion of urine was arrested and black vomit set in at 1 o'clock p. m., thin and of the bees-wing variety, which ran from his mouth as if it was pumped out. The morning following, besides the black vomiting, black liquid stools were frequent; delirium and hiccough came on, and death succeeded at evening on the third day. For thirty hours before death his stomach refused everything offered.

"At eight o'clock in the evening of March 5th, Thomas Anderson, of the carpenter's gang, who had been working at the bench on the orlop deck, was seized with a chill. Fever, general pains, nausea, and the white vomiting regularly succeeded that night, and he slept none. He complained the next morning of a choking sensation, and the nausea lasted over the 6th. His eyes were quite yellow, and ptialism resulted from a single purgative of calomel, followed by oil and quinine. He improved rapidly, and on the 18th, at his earnest solicitation, was discharged to duty, but the following evening had a relapse, with repetition of all original symptoms, from which, however, he safely recovered.

"March 7th the next case developed, that of Herman Zimmerman, boy, aged 16 years. He was one of the dingey's crew, and for falling asleep in his boat and letting her get adrift when off for marketing on the morning of the 6th, was kept during the rest of the day pulling at his oars, in the sun, the boat being made fast to the boom. This did not come to my knowledge till sometime afterward. Distressing nausea and a sense of gastric distention were first complained of; gave him an emetic of ipecacuanha and mustard, and after its operation the nausea ceased. Hot mustard pediluvia and bottles of hot water were employed without exciting diaphoresis. He made loud and incessant complaints of the pains in his head and back, which were scarcely mitigated by large and repeated doses of compound spirits of ether and morphia. Bowels were purged by calomel followed by oil. The second day an abundant vesicular eruption appeared on the forehead and about the mouth. Stimulants were freely given. Restlessness, jactitation, and sleeplessness were unrelieved. On the 10th he became wildly delirious, lay upon his

back, eyes staring, pupils dilated, head rolling from side to side, wailing incessantly, blood oozing from mouth, evacuations involuntary and these conditions were unchanged until suddenly arrested by death on the 11th of March, the fourth day.

"The next case was that of Henry Miller, seaman, a volunteer nurse, who had been in faithful attendance from the outbreak of the pestilence. He was seized in the night of the 15th of March with a chill, and immediately afterward most intense pains in head and back commenced. Several hot mustard baths were required before the establishment of diaphoresis, after which we commenced giving twenty-grain doses of nitrate of potassa every third hour, and continued it for two days, with stimulants p. r. n.; also took several cut-cups from nucha and along spinal column. On the third day a vesicular and pustular eruption came out quite thickly on his face, neck, and arms. Nausea, vomiting, great prostration, and unfavorable symptoms generally continued until the 22d, when his convalescence began.

"March 16th another case appeared. John Regan, gunner's mate, aged 35, had a chill at 11 o'clock a. m., and there was immediate and great prostration, followed by 'splitting headache,' pains in back and limbs, and his eyes were suffused and pinkish. Ordered for him a hot mustard bath and a mercurial purgative. After he had perspired freely for an hour commenced giving him nitrate of potassa, fifteen grains, repeated every two hours, and took a few cut-cups from nucha and back. Black vomit appeared on the 18th; the nitrate of potassa was continued with stimulants. On the 19th his ejections were white in the morning, but at evening again black; his conjunctiva yellow, and an abundant eruption resembling acne came out upon his arms and thighs. Treatment unchanged. On the 20th his stomach was too irritable to receive nourishment or medicine, and he again at evening ejected a large quantity of black vomit. From the 21st he convalesced and was discharged to duty April 1st with a pretty yellow body.

"Mr. William T. Bull, aged about 25, paymaster's clerk at the naval storehouse in Panama, died March 23d, after five days' illness, having had black vomit profusely. He had been attended by a resident physician, an employee of the railroad company, who denominated the disease 'bilious intermittent fever' and denied that yellow fever existed on the isthmus. Mr. Bull was visited by Dr. Marsh during his illness and seen by him just before death, and he recognized the malady as yellow fever beyond any question.

"At about midnight, March 21st, Harold Nelson, aged 23 years, a sturdy seaman, was suddenly attacked. This man had but recently endured five days' confinement in the cells on the orlop deck. He had no black vomit but most of the other prevalent symptoms, and

they were quite severe in degree. He was discharged to duty the twelfth day from seizure, and his treatment was very similar to Regan's, nitrate of potassa, after establishment of diaphoresis, being the principal remedy employed.

"Charles Thompson, quartermaster, aged 28, and of full habit, came off watch at noon March 27th and reported himself sick. He seemed stupefied; skin was hot; pulse sluggish; eyes congested; and he ached in every part of his body. Put him in the hot mustard bath; gave a calomel purgative; took four cut-cups from nucha; and gave him fifteen grains of nitrate of potassa every two hours. March 28th lay upon his back all day like a stunned animal; was aroused with difficulty, when he would complain of general pains. Put him again in the hot bath, repeated the cupping, and continued the administration of nitrate of potassa; 29th, he voided six ounces of urine, the first since attacked; it yielded no albumin. His eyes were yellow; pains unchanged. Continued the nitrate of potassa, with stimulants occasionally, and employed external warmth. On the 30th a pustular eruption appeared about his mouth, and on the 31st hemorrhage from mouth and nose; treatment continued as on the 29th. He slowly convalesced from April 1st, and was discharged to duty May 1st.

"April 1st the commanding officer received from the Secretary of the Navy an order to proceed to sea with the *Jamestown* without delay and to proceed as far northward as he might consider necessary for the reestablishment of the health of the ship's crew, and to bring up at San Francisco. We sailed, in compliance with that order, April 2d, at evening, the fever having then been endemic on board over three months. Never men more gleefully sprang aloft, never clank of windlass sounded more musically than on that occasion. To clear that hated bay, to shut out the sight of the headboards which whitened the steep sides of Flamenco Island, seemed like escape from inevitable doom. In the reprieve further calamities were unexpected, inconsiderate of the ferment with which we were freighted.

"The day before sailing, Charles Hawkins, steerage steward, aged 30, and effeminate in appearance, was attacked; he was excessively prostrated, and there was great nervous oppression. Black vomit appeared April 4th, recurred twice on the 6th, once on the 7th, and again on the 8th, and each ejection was profuse. He became delirious on the 6th, and his mind remained unsettled until the 9th. A minute pustular eruption spread over his neck, and oozing of blood from the mouth and nose continued many days. The surface of his body turned bright yellow after the eighth day, and convalescence began on the 11th. The treatment was commenced by hot mustard baths and a mercurial purgative, and during the first ten

days gave nitrate of potassa in ten-grain doses three or five times per day, as the condition of his stomach would allow. Milk punch, eggnog, brandy, ale, wine were given as he fancied, and sinapisms and cups were frequently called into requisition.

“Louis Ross, sailmaker’s mate, was admitted April 11th, presenting the common symptoms and appearances. He stated that he had been feeling badly for two or three days, but kept at work on a sail that was needed. He experienced considerable difficulty in breathing and a sense of thoracic distention; soreness of throat was also complained of, and he vomited frequently, the ejections containing mucus and bile. He was treated with the hot mustard bath, sinapisms, and external heat; the nitrate of potassa was regularly continued with stimulants. The case progressed favorably without any unusual developments, and was discharged on the thirteenth day.

“William Jared, yeoman, aged 21, the next subject, was attacked suddenly and severely in the evening of April 14th. He was put in the hot mustard bath, given a mercurial purgative, and fifteen grains of nitrate of potassa every two hours. During the night of the 16th he became wildly delirious; surface of his body and the extremities were cold, and his face and ears leaden-hued. Took six ounces of blood by cups from nucha, shaved his head, repeated the bath, applied sinapisms to epigastrium, and continued the potas. nitr. His mind became clearer the 17th, but he was very nervous and restless. His eyes and skin were yellow, vomiting of white and bilious matter occasionally streaked with blood occurred, and the prostration was complete. He recovered and was discharged the eighteenth day from seizure.

“James McBeth, ordinary seaman, aged 19, and very robust, came down from his watch on deck at 1 o’clock in the morning of April 13th, having a light chill, which lasted but half an hour. Gave him two ounces of whisky, twenty grains of calomel, and turned him in under blankets. In the morning he made but slight complaint of dizziness and headache; there was no fever then nor during the following day; his eyes were clear, appetite good, and he slept well. R—Potass. nitr., gr. 10, t. i. d. The 16th and 17th nothing apparently was required; he wanted to go to duty, which was permitted on the 18th, but that evening he was seized with headache and shivering; his pulse was full and eyes suffused and pinkish. He was put into the hot mustard bath and six ounces of blood taken by cups from the nucha. Fever came on and continued all night with great thirst, and next day with nausea; he relished and retained, however, some mutton soup and ale. Bowels were opened by calomel, followed by sodae et potass. tart., ozss. On the 20th he was greatly prostrated; said that he felt half dead and stunned. More blood was taken from nuchal region by cups. He vomited at noon and complained of sore-

ness of throat; his tongue was tremulous, black in center, and yellow-edged. Gave him one dose of tinct. ferri chlorid., but it seemed to increase the nausea. Ordered milk punch every hour, and flying sinapisms to be employed. On the 21st the headache was intense; skin hot like a stovepipe; mind wandering. Again he was put into the hot mustard bath and two cups cut upon the temples. At midday black vomit appeared and recurred at evening with hiccough. As his stomach would no longer retain milk punch, its administration was continued by enema; external heat kept up. Delirium set in at night, and he remained unconscious, with short and labored breathing, until noon the next day, when he died. Black-vomit stools were frequent during his last day of life, and the eruption was abundant on neck and chest, and a few vesicles on the face; the body a dirty bronze color; no albumin in urine. Death resulted the fourth day from relapse and ninth from first ailment.

"Accompanying McBeth, when he returned in relapse, was Alonzo Horton, ship's cook, aged 36, shivering and complaining of headache and general pains. The surface of his body was cold, pulse sluggish, eyes brilliant. He was kept a long time in the hot bath, and afterwards surrounded by bottles of hot water under his blankets, but without exciting diaphoresis. Several cut-cups were taken from his neck and back without relieving the pains, which were severest in the lumbar regions. April 19th bowels purged by calomel; his tongue had a seared appearance; gave nitrate of potassa, twenty grains, every two hours and a half. The pains in his back being intensified on the 20th, six more cut-cups were taken from the lumbar regions. White vomiting occurred at 9 o'clock a. m., black at 2, 4, and 9 p. m., with severe cramps, particularly in the legs. Suspended medicines on account of the nausea, though stimulants were well borne. Camphor and chloroform mixture were given after each act of vomiting. April 21st, no urine had been voided since 8 o'clock the previous morning; applied warm fomentations over the bladder, and resumed the administration of nitrate of potassa, and gave milk punch every hour until midday, when black vomit recurred, precluding their continuance. Toward evening about an ounce of bright yellow urine was drawn by the catheter, and later the same quantity was voided. It contained no albumin. Between 7 and 11 o'clock that evening he had eight copious black vomit stools. Milk punch not being well borne, substituted undiluted brandy; soon that was ejected, after which it was given by enema every hour. The temperature of the body continued to diminish. At two o'clock in the morning of the 22d, hiccough, and delirium of a mirthful character, supervened; but soon stupor and mutterings succeeded, and continued until death, which followed before daylight the fourth day. The corpse was completely bronzed in appearance.

"These two cases were the first which had terminated fatally in forty-two days. We were then twenty days at sea, and in that time had progressed only seven hundred and fifty miles, and were still in a lower latitude than the place of departure. When the weather had been fair it was calm and stifling; when there was wind it came as a rain squall, and ports were closed and hatches hooded, housing us in noisome vapor. Within a few degrees of the line, a blood-colored sun overhead, a hot and coppery sky surrounding,

Day after day, day after day,
We stuck, nor breath nor motion;
As idle as a painted ship
Upon a painted ocean.

"But moderately outfitted with luxuries for the sick, those few nearly exhausted—no ice nor chance for supplies—the prospect was dismal, and its disheartening effect clearly perceptible upon the ship's company.

"Two days after the burials at sea, George Ellis, ordinary seaman, was attacked. The case was quite mild, but in its course the diagnosis was unequivocally substantiated. He became well enough for duty the ninth day.

"Two weeks after my arrival on board the *Jamestown* I had a pretty sharp attack of fever, lasting three days, and which though recorded as febris communis, I flattered myself might have been yellow fever in mild form. I also assumed security from the circumstance that after the arrival north of the *Dacotah*, in October, 1862, with yellow fever on board, which we contracted in the West Indies, I had a fever of considerable severity, with many symptoms common to the epidemic; but this 27th of April I was suddenly stricken down. A feeling of malaise had induced me to take a blue pill that morning, but at half past 10 o'clock a chill, preceded by a palpable aura, came upon me with great suddenness, and lasted three hours in spite of my being twice put into a hot mustard bath, bottles of hot water surrounding, and blankets piled upon me. With sweating, high fever came on; while frontal headache, almost insupportable pain in lumbar region, cramps in legs, and nausea were constant together with insatiable thirst. Dr. Marsh gave me, at 2 o'clock p. m., twenty grains of calomel, and took two cut-cups from nucha; also employed dry-cups along spinal column and flying sinapisms. Dr. Marsh recorded that my eyes were suffused; tongue foul; pulse full and hard; great prostration. At 4 o'clock p. m. became delirious. R—Potas. nitr., gr. 20, every three hours. Mind became clearer in evening. The pains were so intolerable down my back, thighs, and legs that the parts were painted over with tincture of iodine, and a full anodyne of comp. spirits of ether and morphia was administered. The prostration was so complete that

I could neither rise up nor turn in my berth without assistance. Cathartic operated twice in the night; urine voided. April 28th Dr. Marsh's record is that I passed a very restless night; eyes congested; tongue black through center and yellow at edges; thirst and nausea unmitigated; pulse slow and feeble; considerable fever and headache; all these symptoms accompanied by great prostration and disinclination for food; taking nitrate of potassa, ale, claret, or sauterne, as before. My cognizance of occurrences that day was much confused; 29th, fever continued through the day; passed a very uncomfortable night; expectorated dark matter (which, flowing up in my throat without voluntary effort, had a saltish and oily taste); treatment as yesterday. In p. m., on account of severity of pains, was given tinc. opii gtt. 40 by enema. Had eleven black vomit dejections during day; 30th, the eruption, as mentioned in former cases, appeared about mouth and nose; eyes yellow and tongue foul; no inclination for food. In the evening was noticed a great improvement as regards all important symptoms. The eighth day from attack I resumed my duties, though much debilitated and without appetite. As sequelæ were oozing of blood from the gums, a continuous headache, and a protracted diarrhea. During the first three or four days of my sickness, though realizing the impropriety and danger, I could not resist the impulse to throw off the clothing and attempt to get out of my berth, and I had recourse to various expedients to divert the attention or send away the attendants that I might accomplish it; although with the constant dread of exciting vomiting thereby, I could not restrain myself from large draughts if liquids were left within my reach; any, however, that were sweetish were particularly distasteful. Desirable as it is that the fullest and most minute observations be given by physicians of unusual diseases they may have survived, I regret, on that account, that during the progress of yellow fever in my instance the interest and attention, so far as consciousness was complete, were most decidedly personal and very little professional. Dr. Marsh declared me to be a most troublesome patient.

"Following is Dr. Marsh's record of the case of George Bradley, corporal of marines, aged 25, and very athletic, who, an hour and a half after my seizure, had a chill lasting over an hour, during which he was delirious. Copious perspiration followed after the hot mustard bath, and his mind became clearer. Pains in head, back, and legs very severe, also in thorax. White vomiting soon occurred, afterward it was bilious, and at evening dark. Was given a mercurial purgative, had cut-cups to neck and back, and flying sinapisms were employed. Throughout the night he was very restless; voided his urine naturally. April 28th, eyes suffused; mind wandering. Repeated cut-cups to nucha, and gave hot soups and stimulants. No

remission of fever, and he again vomited black matter; 29th, eyes yellow; eruption out on forehead and neck. Appétite good. Black vomit, with hiccough, set in at half past 9 o'clock in the morning, and recurred six times during the day and evening. Was given ether one drachm, after each act, which afforded temporary assuagement: 30th, five ejections of black vomit occurred during the day; hiccough at intervals; mind clear; pulse quick and feeble. Milk punch was given every hour by enema. Abdomen tympanitic; applied a poultice of mustard and vinegar, and gave forty drops of tincture of opium by enema. May 1st, black vomit and hiccough recurred at 10 o'clock a. m. with great thirst, and he became delirious at 2 o'clock; later he passed a perfectly white and clayey stool, and gulped up a large quantity of black vomit; he continued unconscious, with short and labored respiration, until evening, when he died on the fourth day.

"Two and a half hours after my attack, and one after Bradley's, Mr. Leakin Barnes, acting ensign, was similarly and as suddenly taken. His chill was prolonged, prostration and pains were excessive, and the matters vomited were white at first, and afterward streaked with blood. The eruption, which was quite extensive, appeared the third day. He convalesced favorably. Treatment, very nearly as described in preceding cases. This officer was an inveterate smoker, and also a chewer, but after recovering from this disease his taste for tobacco was entirely lost, nor had it returned when I last saw him, the following year.

"April 29th, Charles Brown, ordinary seaman, was seized. He described his pains as wicked. The disease progressed rather mildly; the diagnosis, however, was fully confirmed, and on the 7th of May he was convalescent.

"William J. Rothman, carpenter's mate, aged 32, of saturnine habit, was the next attacked, on the 3d of May. The third day afterward the secretion of urine was arrested, and black vomit set in with delirium. He died May 9th, the sixth day. The eruption was present, and petechial on abdomen. No albumin in urine. Treatment very similar to Bradley's.

"Edward Slackford, ordinary seaman, was seized with a severe chill followed by fever, pains, nausea, etc., at 1 o'clock p. m., and George Thompson, private marine, at 4 o'clock the 5th of May. The eyes of both were congested and pinkish; both vomited white and bilious matter in the evening, and became delirious. All of their symptoms were very similar, save that Slackford's prostration was the more excessive, and his delirium lasted the longer. Their nausea and vomiting continued, and at the same instant, in the evening of the 8th, each ejected about a quart of black vomit. The eruption appeared on both, and their eyes and skins were yellow. No albumin was detected in the urine of either. On the 5th day a favorable

change occurred with each, though both were greatly prostrated, and Slackford wonderfully emaciated. Thompson was discharged to duty May 22d and Slackford 24th. Treatment, as hereinbefore particularized—nitrate of potassa, after diaphoresis was excited, and after purgation and stimulants p. r. n.

“Peter Sullivan, captain of forecastle, in the evening of the 10th of May experienced sudden prostration, with frontal headache and pain in back and legs; his eyes were dull, skin damp, pulse sluggish, tongue pasty. Soon after he had a chill, succeeded by fever and vomiting of white and bilious matter, and the pains in lumbar region became intensified. The eruption appeared in due time, and the disease subsided as in regular course. No trace of albumin in urine. He was discharged the 19th, but in four hours relapsed. By the 24th he was well enough for duty. The treatment was employed which had almost become “stock.”

“Edward Smith, apothecary, a youth of 19, accompanied me from New York, accepting his appointment, knowing of the pestilence to be encountered and of the great danger to an unacclimated person suddenly migrating from a northern winter to an infected ship in the Tropics. With a view to prophylaxis I gave him two grains of quinine, morning and evening, during the week after our arrival, and pil. hydrarg., gr. 5, at intervals of ten or fourteen days; also five grains of nitrate of potassa with the quinine. This course was resumed for a few days at a time at irregular intervals for two months, and stimulants were occasionally given when his duties were more than usually fatiguing. Regular bathing was practiced. But, in the evening of May 11th, he was seized with typhus icterodes. We put him into the hot mustard bath and gave pil. hydr., after which high fever came on, and his mind wandered. White vomiting occurred several times, his thirst was urgent, and he complained of a burning sensation in his throat. Flying sinapisms and bottles of hot water about his body excited but slight diaphoresis. Took three cut-cups from nucha. The pains were unrelieved, and he slept none; a burning fever continued all night. Next morning warm saline enemata produced but one small stool; the mercurial was repeated, and three cut-cups were taken from his lumbar region; his head was hot, pulse 120, tongue seared. In the afternoon the hot mustard bath was repeated, inducing diaphoresis and moderating the fever and pains. Gave him claret and gum water *ad libitum*; also 10 grains of nitrate of potassa every two hours, which was retained, though food excited vomiting. In the momentary absence of the nurse he got up, prepared and swallowed about two drachms of citric acid in six ounces of Tarragona wine. May 13th, 2 o'clock a. m., fever and delirium increased; skin like a stovepipe; bowels unmoved; repeated the saline enema without result. At 4 o'clock

he became quite unmanageable; two more cups were taken from nucha and three drachms of potassae bitartras administered; after this he slept for a short time, the first since attacked, and his urine was voided involuntarily. The nausea ceased so that he ate a little tapioca; he took also milk punch every hour, and ten grains of nitrate of potassa every two hours. But soon the delirium increased, and his head rolled from side to side, with pupils widely dilated. At half past 9 o'clock gave a turpentine enema without effect. Abdomen tympanitic; rubbed it over with croton oil and applied a large blister. Three drops of croton oil were placed upon his tongue; but no movement resulting, at 2 o'clock p. m. gave him another turpentine enema, when half an hour afterward there came away in his cot a large quantity of black offensive feces, and in the night he had two more involuntary evacuations, black and very offensive. His delirium became so violent that we were obliged to anesthetize him, in which condition he rested an hour and a half. May 14th, not a favorable indication; five ounces of bright-yellow urine were drawn by catheter; none had been voided in twenty-four hours; it contained no albumin. At 5 o'clock p. m. black vomit appeared, and recurred repeatedly and profusely in the night. He died early in the morning, May 15th, the fourth day.

"Mr. Robert H. Carey, acting ensign, aged 36, was seized with chill and pain in head and back just before midnight, May 13th, and soon after vomited white and bilious matter, and the vomiting was repeated several times before morning. Copious diaphoresis was induced by covering him with blankets and giving hot drinks. R.—Pil. hydr. gr. 20. Statim; 14th, he had high fever, frontal headache, pains down inside of thighs and legs, great thirst; his eyes were congested and pinkish, tongue white and flabby, pulse full, though not much accelerated. Four ounces of blood were taken by cups from his nucha, and he was given one drachm of nitrate of potassa during the day. At evening he had three black stools, and was stupid and somnolent; 15th, he had slept all night and was aroused with difficulty in the morning, when he complained as on the previous day. The general appearances were unchanged; skin and kidneys secreting, bowels free; 16th, still very somnolent. Eyes and skin yellow; eyeballs painful; no appetite; eruption out on neck and arms. Continued the nitrate of potassa, but no stimulants were given. He commenced convalescing the 17th, and the 22nd was recovered.

"Thomas Toner, landsman, aged 20, and slender in habit, was seized with a chill at half past 2 o'clock p. m., May 15th, and had the characteristic pains, with constant nausea. His left eye was merely suffused, while the right was entirely pink. The sight of the latter had been destroyed some years before, but in health the appearances

of both eyes were similar. Ordered for him the hot bath, purgative, and nitrate of potassa; 16th, he had considerable fever, but his pains had diminished to a sense of general soreness of flesh. Pulse was feeble and quick; appearance of eyes unchanged; skin moist; urine voided naturally. Continued the nitrate of potassa, with stimulants. On the 17th there commenced a general improvement, and from that date progressed favorably and patient was discharged May 23d. The eruption appeared on neck and chin.

"Peter Harmes, ordinary seaman, aged 24, and a stolid Teuton, was attacked suddenly and at the same time with Toner. There was great prostration, prolonged chill, and intense pain. High fever followed after the bath. Nausea was constant, and fever with a stove-pipe skin continued throughout the night. Gave him twenty grains of nitrate of potassa every two hours, and took blood from nucha by cups; 16th, bowels purged by calomel given at the first, no moderation of the fever, nausea distressing, continued the nitrate of potassa; 17th, stupor and nervous depression, eyes yellow, tongue black, neuralgic pain in testes, nausea unrelieved. No urine had been voided in forty-eight hours. Drew off by catheter nearly a quart, which yielded an abundance of albumin. Continued the treatment; 19th, a decided improvement commenced and continued. He was discharged May 27th. The eruption appeared on face and neck.

"William Martin, steerage cook, aged 22, was attacked before daylight, 17th of May, and his symptoms were grave. Employed the hot mustard bath, bottles of hot water, and gave purgative dose of calomel. High fever continued all day with great thirst, nausea, vomiting, and prostration. He took fifteen grains of nitrate of potassa every three hours. At evening white vomiting recurred and the heat of skin and pain in head increased; 18th, he passed the night very restlessly; stupor had advanced; skin yellow and dry and emitted a musty and offensive odor; tongue dirty yellow and denuded at edges; pulse excited and irregular. He was again put into the hot mustard bath, the nitrate of potassa continued, with milk punch *ad libitum*. He became delirious at evening and his urine was albuminous; 19th, no improvement; eruption thick on face and neck; medicine and stimulant continued as on preceding day; 20th, hemorrhages from mouth and nose occurred and black vomit appeared at half past 10 o'clock a. m., and recurred several times during the day and evening. Delirium and hiccough also continued and convulsions supervened before death, which resulted early in the morning of May 21st. the fourth day after his attack and our forty-ninth day at sea. in which time we had experienced twenty-six days of heavy rain and the average daily temperature had been—maximum, 85.7°; minimum, 80.3° F.

"Henry Duell, ordinary seaman, was attacked May 19th, early in the morning, and pretty severely. Treatment was after the routine of cases, subsequent to leaving Panama. A decided and unusual improvement occurred during his second day of illness, though the distinctive features of yellow fever were observable. The favorable change I attributed, in a good measure, to diminution of ten degrees in temperature.

"The last case was developed May 23rd, in latitude $22^{\circ} 35'$ north, longitude 126° west. Temperature, maximum, 72° ; minimum, 68° . John Smith, quartermaster, was the subject. He was taken with a chill, followed by nausea, supraorbital headache, congested and pinkish eyes, incrustated tongue, severe pain in limbs and lumbar region, and fever of moderate character, which was maintained without any variation for two days. The fourth day his eyes and skin became yellow. He was discharged to duty May 28th, our fifty-sixth day from Panama. San Francisco was reached June 7, and our pilot's was the first sail to greet our eyes throughout that memorable passage of sixty-six days.

"Thus succinctly are presented the inception, progress, and termination of as malignant an outbreak as our service has endured. Forty-eight cases and twenty-one deaths are enumerated, of which nineteen had developed before my arrival, and thirteen of them had fatally terminated; twenty-nine cases, with eight deaths, subsequently resulted, twenty of which, and six deaths, occurred at sea. In regarding this summary it is noticeable that three persons died without having had black vomit or suppression of urine; one who died was pyralized at an early stage of the disease; six recovered after having black vomit; three survived in whom the secretion of urine was arrested; eight recovered, having been delirious; after hemorrhage from mouth and nose, five recovered; nine had black vomit stools, of whom seven died; the urine of eleven patients was tested for albumin, and it was found but in two—one of those two patients died. Possessing but a small quantity of nitric acid, and no test tubes, we were unable to render fuller statistics in that particular. Had the means for hypodermic medication been possessed, much more suffering would have been alleviated than our resources afforded. Should duty again circumstance me as in the instance recounted, I would hardly employ a less effectual and prompt cathartic than croton oil. Mercurials were not obviously beneficial. I could not discern any utility from the administration of quinine, and early discontinued its employment, though on board the *Dacotah*, in 1862, its efficacy was very marked, but before the epidemic in that ship our crew had suffered severely from malaria, encountered during the summer up the James River while cooperating with the Army in the first peninsular campaign. But those

manifestations were quite different from these of the *Jamestown*, and were much milder in type. On the *Dacotah* we had twenty-five cases, and not one was lost; in two only did black vomit appear, and only in about half of them were displayed the characteristic discolorations. Beyond the modifications first before suggested I would not depart from my line of treatment pursued. Especially efficacious seemed the agency of the nitrate of potassa as an eliminator of the specific poison by its diuretic and diaphoretic action, and not in a single instance did it seem to incite or increase visceral irritation. The moment for commencing stimulation, and the extent to which it may be carried, can not be indicated by any general rule, and can only be judged by the particular conditions in each individual case.

"Some further observations than the few hereinbefore given respecting topography and meteorology may be relevant and appropriately introduced here.

"The walled city of Panama occupies a small peninsula, about half a mile long by one-quarter in width, extending easterly from the bases of Mounts Ancon and Gabilan. The walls are crumbling in many places, and the western line and portion have been pulled down, and the wide and deep moat filled in for roadway crossings in some places, but generally it is only piled and choked up with deposits of rubbish and filth. Within the city proper is a population of from three to four thousand, and nearly the same number inhabit the *arrabal*, or collection of miserable abodes, which extend like excrescences from the walls. Drainage is unknown. Even the water for drinking and culinary purposes is brought in on donkeys from a stream, by no means taintless, outside the city limits. Water for the shipping, however, and with which we were supplied, is obtained from a stream on the island of Toboga, nine miles away to the southward, and, though reputatively very pure, is somewhat questionable to those who have observed the laundry and bathing operations along its banks, as, descending from the mountain, it lingers in shady and convenient pools. Scavengers are wanting, too, in Panama, save the buzzards; and the habits, persons, and dwellings of the lower orders (most interminably mixed as to blood), both without and within the walls, are repugnant and filthy. Disgusting odors assail the nostril at every turning, and the visage and demeanor of the denizens in general bear evidence of the perniciousness of their climate and its enervating effect. The tide rises fully twenty-two feet up to the city walls, but in receding leaves bare long edges of volcanic rock and coral with sand patches between, which afford lodging places for offal and other refuse thrown out. Upon the ramparts, turning from the charming view of the islands which, under the enchantment of varied distances, adorn and diversify a bay next in celebrity after Naples and

Rio, there is afforded a vista even more attractive—of mountains and gigantic forests, of valleys and jungles impenetrable, of lagoons within savannas on which half-wild herds are grazing; and where the foliage is rankest and flowers most gaudy are hidden the bayous with their slimy banks; and there beneath the damp shade of the profuse vegetation, which decomposes under the influences of moisture and a constant summer heat, is the lair of intensest miasm. The whole Isthmus is its habitat and has been for years and undoubtedly will be to the end of time, and from no part or place has it been or can it be excluded. Acclimation is impossible; no one, of whatever race or country, who becomes a resident of the Isthmus escapes disease; not even are beasts exempt, and nothing but change of climate can eradicate the effects of the poisoning from that malaria. Intermittent, remittent, bilious, and congestive fevers and dysenteries are the usual results of the climatic influences, but under intenser excitation yellow fever appears. The belief is well grounded that yellow fever never leaves certain localities which it has once invaded and where the conditions for its existence are constantly maintained. It may seem dormant for a time, or only sporadically evincing its vitality before it rouses itself and appears epidemically. I know that it existed at Panama, at Toboga, and among the shipping of the bay while I was attached to the frigate *Merrimack* on the Pacific station in 1857–1859, and that it has played havoc in each of those designations several times since. At Aspinwall, when en route to the *Jamestown*, the late Dr. Klugé (victim at last to the Isthmus malaria) told me that he had recently treated ten employees of the railroad company who had yellow fever, and eight of them died. And at that time the numerous deaths along the line from Aspinwall to Panama were exciting special comments, though they were attributed to bilious, congestive, remittent, and intermittent fevers; or by two or three or more of such nosological combinations of terms a nomenclature was provided less oppugned to lucre than yellow fever, but none the less fatal to human existence. The evidence of the direct transportation of yellow fever from Panama to the *Jamestown* is clear and indisputable, though for my temerity in maintaining that proposition, and for intimating that the Isthmus has not par excellence the most salubrious of climes I drew upon myself the maledictions of the two Panaman newspapers—the organs, respectively, of the two great commercial enterprises—in which leaders with emotional headings established the health of Panama and vituperated the *Jamestown's* surgeon. Even a member of the Royal College of Surgeons, England, in the employ of a third commercial organization, under his distinguished sign manual published and proclaimed the sound sanitary condition of the Isthmus. The pestilence was conveyed, unquestionably, from the shore to the ship three miles out

in the bay, first, by McSoley and Hanson, the marines who were on duty at the storehouse, in one of the most unhealthy locations in Panama, from December 8th to the 19th, at which last date they were returned on board with their bags, hammocks, and accouterments; and that night of the 19th McSoley was attacked with yellow fever, and Hanson on the following 21st of January; secondly, by Gicquel, who had been on shore for several days and nights doing some work for the commanding officer, and who, December 23d, was brought on board and confined under the sentry's charge; one week afterwards he was attacked with yellow fever and died. The propagation of the pestilence was consummated on the orlop deck, where McSoley and Hanson stowed their effects and slung their hammocks; where McSoley remained through his sickness; where Gicquel was confined, where he worked at the bench, where he was taken sick and remained until the day before his death, when he was removed to the gun deck; where Sergeant Maxwell was sick, where he and the other marines who had the fever slept; where the cells were from which the four patients were relieved January 18th; where some of the infected clothing of the first three victims probably was stowed after their deaths, and its distribution among the ship's company; where Anderson, attacked March 5th, worked at the bench; and where afterwards worked Rothman, who died; and where Nelson had been confined for five days just before his seizure. In other localities the ferment seemed also to linger: For instance, I succeeded to Dr. Duvall's room and disease; after Mr. Bate's death Ensign Barnes occupied the paymaster's room, and had the fever; Mr. Carey was attacked in the room next to the one in which Mr. Adams died and with which there was communication through the bulk-head; the officer who took Mr. Adams's room had had yellow fever and hence escaped. The attendants upon the sick suffered to an extent that almost typified contagion. Dr. Duvall was among the early sufferers (Dr. Du Bois, having had the disease in the Gulf of Mexico, was an exempt almost to a certainty); Miller, the constant nurse up to March 13th, was then stricken down; my attack came next in order; then Edward Smith, the apothecary, sickened and died; and last, Bradley, who was acting apothecary when I arrived with Smith, and who was retained as nurse and assistant in the dispensary until his fatal sickness.

"It is pertinent, in considering the portableness of yellow fever, to cite the instance of the mail steamer *Golden City*, which arrived at Panama March 4th. and the same day an officer of the *Jamestown* removed his wife from their lodgings on shore to the steamer for passage to San Francisco. Each day there was communication between our ship and the steamer, and a quantity of luggage was transferred from the former to the latter. The *Golden City* sailed on her

return trip March 10th, but before reaching Acapulco the servant that attended the room occupied by the officer's wife (and by the officer also at Panama) died of yellow fever, and three other cases and two more deaths resulted before the cold latitudes were reached. It is possible that the ferment was received on board from the shore, but more probably it was carried from our ship—a question distressing to the parties who innocently but unwarily were thus concerned in it.

“It is to be remembered that the rainy and sickly season ended before the pestilence broke out on the *Jamestown*, and that her stay at Panama was in the dry or healthy period, the climatology of which I daily observed and considered; and as evidence of its general phenomena, I noted that the average daily temperature during the first quarter of 1867 was (F.) 78°.2 at 6 o'clock a. m., 84°.2 at noon, 81°.9 at 6 p. m., and 79°.1 at midnight. There was an absence, for the greater part of the time, of northerly winds, which are commonly prevalent throughout the dry season, and rain showers occurred quite frequently, so that the unpleasant dampness and moldiness penetrated everywhere—into books, bedding, clothing, and packages, no matter how secured. The atmosphere was sultry and stifling, and earthquakes, though slight, were not infrequent. In name only was the season either dry or healthy. At San Francisco I was permitted by the health officer of the port to examine the sanitary reports furnished him by the surgeons of the Panama steamers on their arrival. I do not remember an exception but that, on every return voyage, for months from and after December, 1866, cases of yellow fever, or some exceedingly suspicious diseases, were returned; and the same held true at the port of New York. I have in preservation a formidable list of deaths which resulted from crossing the Isthmus in the ordinary line of travel during that year of 1867. An officer on board the United States steamer *Resaca*, at Panama, July 1st, 1867, wrote me that the fever still continues here; deaths, five per diem just now. One by one the strangers are picked off. The Panama Mail Steamship Company's steamer *Montana* had several cases and lost two engineers just before leaving here last trip. The *Bolivia* (Colombian man-of-war) has it on board, and we have ceased all communication with the shore. Ten days afterwards the commanding officer of the *Resaca* reported that the fever had appeared on the ship, and that, by advice of the medical officer, he should leave immediately for a cold climate; that it was very fatal among foreigners and the troops ashore; and that the surgeon of Her Britannic Majesty's steamer *Scout* had just died of it. (Nineteen others also died on board the *Scout* before she reached Esquimalt, Vancouver's Island, for which port she started at the instant of the appearance of the yellow fever among her people.) The

Resaca drove northward under full steam, but before gaining the harbor of San Francisco sixty-eight of the crew were stricken down and seventeen corpses hove overboard.

"The *Jamestown* and *Resaca* were ordered to Sitka for disinfection by cold, and I rejoined my ship there in October, about a month after her arrival; and the following month I certified that, in my opinion, any cause sufficient to repropagate yellow fever within the *Jamestown* had ceased to exist; that frost or a low temperature, when continued a sufficient length of time, will effectually destroy the ferment; and that I considered that a sufficient length of time had elapsed. The *Resaca* returned south in January, and, though she has been employed in the Tropics a good share of the time since, she has not had another case of the fever. We, in the *Jamestown*, passed the winter in Alaska, and sailed from Sitka the last of May for Puget Sound, and thence to the Mare Island Navy Yard, where our scarred veteran was dismantled."

Such is the story of the yellow fever on board the *Jamestown*. Many years have passed since that unfortunate voyage ended. Perhaps, by now, the survivors of that fever-stricken crew have gone to join their comrades who were left behind on Flamenco Island, or those who were committed to the waters of the blue Pacific. The *Jamestown*, herself, is now but a memory in naval circles. As to the medical officers of the ill-fated vessel—what manner of men they were, what their hopes and ambitions, we know not. We know they were human and liable to all the frailties of mankind; and we do know from the trail they left that, they, together with those working under their direction, faced death with bravery and fortitude that should be known to those who follow in their footsteps in the service to-day. Therefore, this account is sent forth anew as a tribute to the memory of Delavan Bloodgood, surgeon, United States Navy; E. T. T. Marsh, acting assistant surgeon, United States Navy; and Henry Miller, seaman, United States Navy, and volunteer nurse, who labored throughout the epidemic on board the *Jamestown* and lived; and to the memory of Edwin Smith, apothecary, United States Navy, and George Bradley, corporal, United States Marine Corps, acting apothecary and volunteer nurse, whose labors were consecrated by their deaths at the call of duty.

U. S. NAVAL MEDICAL SCHOOL LABORATORIES.

Additions to the pathological collection, United States Naval Hospital School, October-December, 1914.

Accession No.	Tissue.	Diagnosis.	Collected by or received from—
1102.....	Blood.....	Benign tertian malaria.....	Passed Asst. Surg. G. B. Crow.
1103.....	Blood.....	Myeloid-leukemia.....	Passed Asst. Surg. G. B. Crow.
1105.....	Blood.....	Lymphatic leukemia.....	Passed Asst. Surg. G. B. Crow.
1109.....	Kidney stone.....	.....	Surg. A. M. Fauntleroy.

Additions to the helminthological collection, United States Naval Medical School, October-December, 1914.

Accession No.	Parasite.	Host.	Collected by or received from—
19901.....	Tenia saginata.....	Homo.....	Asst. Surg. J. T. Borden.
19906.....	Tenia echinococcus.....	Homo.....	Passed Asst. Surg. G. B. Crow.
19907.....	Argas persicus.....	Homo.....	Passed Asst. Surg. G. B. Crow.
19910.....	Ascaris mystax.....	Cat.....	Medical Director E. R. Stitt.

SUGGESTED DEVICES.

A CARD INDEX OF SPECIFIC CASES.

By R. B. HENRY, Passed Assistant Surgeon, United States Navy.

The treatment of syphilitic cases, as well as the recording of their treatment, much of which is given aboard another ship before they reach us, is extremely unsatisfactory. The courses of eight injections of a grain of salicylate of mercury once a week—three times the first year and twice in the second and third years—seem a very practical proposition as a standard treatment. The luetic abstract to follow each case—concise and to the point—would be far better than a long form littered up with unnecessary details.

I would suggest that the abstract be provided with small squares for the entering of each injection, so that when a man is transferred the next doctor knows just where to begin, something like this:

		1	2	3	4	5	6	7	8		
Date begun.										Date finished.	
Dec.	7, 1914	1	X	X	X	X	X	X	X	Jan.	25, 1915
Apr.	1, 1915	2	X	X	X					.....
.....		3								.....
.....		4								.....
.....		5								.....
.....		6								.....
.....		7								.....

The trouble in many cases is that men do not appear for treatment at all after coming aboard and are liable to be entirely overlooked. This we have tried to meet by having cards printed on which we enter every case, and with them keep an alphabetical card index so that the main features of all cases are obtainable at a glance without sending for the health records every time. All the health records were gone over in making up these cards to be sure that no case was overlooked, and it is surprising how small a history had been entered in many instances. With men who had reenlisted we sometimes had to be content with such as this from the abstract: "Syphilis, 42 days."

The following is a sample card; we have found them very useful:

Name—Smith, John.		Rate—C. P.	
History. Attached Apr. 1, 1914. Detached ———.		Date initial lesion. April, 1914.	
AD Apr. 10, 1914. Sore on penis. O RA May 25, 1914. Secondaries. H To Naval Hospital, Boston. O Naval Hospital, Boston.		Wassermann.	
		Date.	Res.
RA May 25, 1914. Secondaries.		May 25, 1914	† † † †
D Aug. 10, 1914. No active lesions. 77 Rhode Island.		June 25, 1914	Neg.
RA Aug. 10, 1914. Mercurial treatment instituted. D O		Aug. 8, 1914	Neg.
		Salvarsan.	
		Date.	Amt.
		May 26, 1914	0.6
		June 5, 1914	.6
		June 15, 1914	.6

THE OTOSCOPE AS AN ANTERIOR URETHROSCOPE.

By W. G. STEADMAN, Jr., Passed Assistant Surgeon, United States Navy.

It may be rather a far cry from the ear to the penis and a slight jar to esthetics, but on recruiting duty where instruments are not in great abundance, I have to suggest that the Brunton otoscope, which most stations have, may be utilized as a urethroscope for examination of the anterior urethra for a distance of 2.6 centimeters.

Ulcers that lie only a short distance from the meatus may in this way be discovered that otherwise might be overlooked.

After using wipe off with alcohol and sterilize by boiling.

Possibly this method has been used before, although I have not as yet heard of it.

CLINICAL NOTES.

ADVANCE REPORT CONCERNING HELIOTHERAPY AND IONIC MEDICATION AS EMPLOYED AT LAS ANIMAS, COLO.

By C. J. HOLEMAN, Passed Assistant Surgeon, United States Navy.

The methods described herein have been used for treating certain cases of localized tuberculosis with sufficient success to seem to warrant their further employment and an advance report concerning them.

While neither method is original at this hospital, the adaptation of ionic medication to laryngeal tuberculosis has not been noticed in the literature.

Certain classes of tubercular cases, viz, bone and joint affections, tubercular sinus cases, and laryngeal tuberculosis, have always been sources of worry and disappointment because of their chronicity and the frequency of unfavorable termination; hence it has been most gratifying to find substantial relief for cases of the first and second classes in heliotherapy and for the third group in ionic treatments.

As to the method of applying heliotherapy, there is nothing to be said except that in general the method of Rollier has been followed, of exposing the feet and ankles to the sun for periods of 5 minutes in each hour during the hours of sunshine of the first day, then the legs and knees for periods of 10 minutes on the second day, gradually increasing both the area and time of exposure until the patient is uncovered to the solar activity during the entire day. This plan must be somewhat modified for those of extremely blond type, since it takes them considerably longer to acquire the requisite pigmentation to prevent sunburn, which, if it develops, delays effective treatment until it is cured. Furthermore, this tanning of the skin is the most reliable index to the onset of improvement in the local lesion and in the general health.

Case I: —, seaman. Tuberculosis of dorsal spine. Operation prior to admission to this hospital had resulted in healing with moderate kyphosis. Has moderate pulmonary involvement. Had not been doing well prior to present treatment. Wore brace with benefit, but still suffered considerable pain on trunk motion of any

kind. Treatment began July 4. Responded well, skin bronzed deeply. Has gained 9 pounds, appetite better, and patient feels better than at any time since onset of disease. Temperature unchanged (97° – 100°). Has occasional spinal pain on performing certain twisting motions.

Case II: —, seaman. Patient has light pulmonary involvement, and was doing well until in the early summer his right hip became involved. Treatment began July 25, when patient walked with decided limp and experienced constant pain. After some difficulty on account of the fairness of his skin he reacted and it is now thoroughly tanned. Gained 20 pounds, feels well, and has no pain or stiffness in hip.

Case III: —, supernumerary. Patient had been operated upon by civilian surgeon in January, 1914. A sinus in the right iliac region was discharging profusely on admission. He stated that this incision was made after five rectal abscesses had been treated, and that he was advised at that time that "they were connected." About the middle of July an incision was made in the right loin over a mass that had appeared there and a large amount of Beck's paste and pus were discharged—the resulting cavity admitting a urethral sound to within 2 inches of its total length. Treatment began August 6; considerable difficulty was met as patient was extremely fair, but finally a considerable degree of pigmentation developed. The discharge was then profuse from both anterior and posterior sinuses. At present patient has gained 8 pounds, and the secretion from the anterior wound soaks through one ordinary small gauze sponge daily, and is less in quantity posteriorly. Since October 1, however, patient has run some temperature (97.2° – 100.2°), and there is some tenderness about the right sacroiliac joint. Early in October the anterior sinus, which seemed about to close, opened again and discharged quite freely for several days. Patient feels better at present than he has felt since January, has an excellent appetite, and has slept well until the tenderness noted has made it somewhat painful for him to lie on his right side. It appears not unlikely that some pocketing of pus would occur in so extensive a cavity, and if conditions had not improved exploration would have been undertaken if the patient had not been discharged for insubordination. There was undoubted evidence of sacroiliac disease on admission.

Case IV: —, fireman second class (negro). Admitted with tuberculosis of right knee, with large exostoses of lower femur and upper tibia. Treatment began August 25. Metal and plaster splint removed after preliminary exposures of 10 days. There was some pain and considerable tenderness over the inferior antero-internal portion of the femur, and in a few days some softening seemed to have occurred here, but all these symptoms have disappeared and no

cloacae have developed. At present patient has gained 5 pounds, feels and eats well. Swelling of the thigh has been slightly reduced.

Case V: —, landsman for electrician. Admitted with pulmonary tuberculosis and empyema, said to have followed pneumonia. Had been in hospital about three weeks when treatment was begun on October 1. Sinus then discharged about 2 ounces of creamy pus per diem. Responded well to treatment; has gained 4 pounds, feels much stronger and better generally, appetite is good, and for the last week there has been no discharge. Sinus closed gradually from the bottom, and on October 31 the rubber drainage tube could no longer be introduced. Temperature is normal.

These results are considered quite satisfactory, despite the fact that there are no proper facilities for the full employment of the method. At present a tent erected in lee of the south wall of the men's infirmary is used for the purpose, but this does not afford sufficient protection from heavy rains, and it is necessary, because of the shortage of hospital corpsmen, for the patients to get up for their meals. Also, they are quite remote from toilet and bath rooms. Yet, while their exposure is thus only partial, all of these patients are able to tolerate, without discomfort, temperatures as low as 50° F. if the sun is shining brightly. Furthermore, at night they require only about half the number of blankets used by those patients who are being treated by the ordinary fresh air method.

The course of throat cases here as elsewhere in these high, dry, and dusty regions has heretofore been a steady progression to a fatal termination preceded by distressing dysphagia and inanition. The early stages could be rendered tolerable by daily applications of silver salts and cocain, and in many cases the terminal symptoms could be relieved by hypnotic suggestion or by infiltration of the internal laryngeal nerves with alcohol. Hence the fact that the principle of driving iodine ions by means of the electric current from the surface of the skin is employed at various sanatoriums in treating the arthritides, and that the iodine may be as effectively used if liberated from potassium iodide by the same current, led to the administration of that drug with the idea of obtaining iodine in the diseased tissues by passing an ionizing current through the throat at the time the drug was being eliminated by the mucous membranes. In addition to this, ionization with zinc is used after the method described by Lewis Jones. The treatment, then, as at present employed, consists of the administration of 20 grains of potassium iodide a few minutes before the current is started; the placing in position of a pad of several thicknesses of lint (felt is preferable) soaked in a 2 per cent solution of zinc sulphate in immediate continuity with the positive metal electrode; the placing in an indifferent position near the back of the neck of a large wet negative pole and the employment of a

current varying from 75 to 150 milliamperes from 10 to 20 minutes. If the negative pole be saturated with salt solution, chlorin ions, similar in effect to iodine, will pass forward toward the positive pole. This latter procedure was used for a time, but has been temporarily discontinued. Since the effect on the tissues of the ions of the metals generally employed (zinc, copper, and silver) is similar, zinc is usually selected instead of the silver that would naturally suggest itself, for the reason that, while the individual ion may be somewhat less active, this metal has the advantage of cheapness and the much more important advantage that the velocity of its ions is greater than that of silver, therefore its penetration is better. This penetration is further improved for the reason that it combines with inorganic and organic elements of the tissues with less avidity than does silver, hence progresses further without being rendered inert by chemical combination. However, the effort has been made to obtain the effect of silver medication in addition by instilling argyrol upon the diseased portion of the laryngeal mucous membrane before the current is started.

That there is actual penetration of the tissues by the ions is proven by the fact that the patient will describe the taste of iodine or salt, respectively, when potassium iodide or sodium chloride are employed.

Case VI: —, boatswain's mate first class. Entered hospital with complete aphonia, all parts of larynx infiltrated and indurated, small yellowish nodule in the interarytenoid space. Throat sore, with constant sensation of tenseness and discomfort in laryngeal region. Treatment began July 24 with iodine—potassium iodide solution, driven in from negative pole. Skin burn resulted, and the external application of iodine was discontinued thereafter. Twenty milliamperes of current was employed for 15 minutes; patient distinctly tasted iodine and experienced a grateful sensation of relaxation about the larynx accompanied by free expectoration of mucopurulent secretion. July 28, chlorine employed, liberated from 5 per cent sodium chloride solution. July 31, 20 grains potassium iodide internally, 5 per cent sodium chloride solution at negative pole. Considerable irritation since last treatment, due to the installation upon the ulcerated surface of 1 per cent formalin solution. August 7, treatment given every second day from this date, employing zinc sulphate (2 per cent) solution, to liberate zinc ions from the positive pole, and potassium iodide internally, using a current of 150 milliamperes for 20 minutes. Patient discharged September 21. All feeling of tenseness absent, no pain on swallowing or whispering, aphonia persists; the small ulcer in the interarytenoid space is unaltered in appearance.

Case VII: —, mess attendant third class. Shortly after entering hospital developed laryngeal symptoms—hoarseness, excessive

and altered secretion, making it necessary to cough on beginning to speak, moderate sore throat. Arytenoids and entire posterior portion of laryngeal rim densely infiltrated; no ulceration. Treatment as outlined in case VI carried out twice weekly. All symptoms abated. Patient suffered with headache after some of the treatments and avoided taking them from September 24 to October 13. This was corrected by reducing the current to 50 milliamperes and giving it on every second day. When patient reported on October 13, his speech was thick, and the pitch would alter suddenly, the voice apparently being checked by secretion. A single treatment greatly relieved this state of affairs, and while his voice was still husky on October 17, this choking quality was absent, the impression being given that his throat was dry. His voice is still somewhat husky, but there are no soreness of throat or other symptoms. Inspection shows considerable infiltration, but no tendency to ulceration is apparent.

Case VIII: —, private marine. Patient reported August 1 with husky voice, dysphonia, and dysphagia, with considerable mucopurulent secretion. Larynx diffusely infiltrated, with a yellowish spot, suggestive of beginning ulceration on the anterior portion of the right cord. Treatments given twice weekly, using zinc ions liberated from the positive pole and iodine liberated from the mucous membrane until August 21, when patient ceased reporting on account of pulmonary hemorrhages and rapidly advancing thoracic disease. At this time the only symptom was a moderate huskiness of voice. The infiltration was reduced, no sign of an ulcer was present, and there was no sore throat. The symptoms have since recurred, however, but inasmuch as the patient fancies that the current was in some way responsible for his hemorrhages, and since his case is regarded as serious, it is not thought necessary to urge the treatment upon him.

Case IX: —, paymaster's clerk. Patient began treatment August 15, having had huskiness of voice for over a year, which became worse at night when it was accompanied at times by a moderate degree of soreness. Examination showed epiglottis slightly thickened, with a nodule about one-third inch in diameter on left half of free border, vessels slightly engorged, but tissue between the vascular network rather pale. Nodule touched with argyrol, treatment otherwise as described in preceding case. Patient was placed on retired list October 1, at which time all his symptoms had improved. Voice was still a little thick, but there was no evening increase in huskiness, and he had had no angina for several weeks.

Case X: —, boilermaker. Reported for treatment July 25. General condition bad. Pulmonary tuberculosis far advanced. Tonsillitis and pharyngitis present, with numerous yellow patches on

tonsils, fauces, and pharynx. A current of 50 milliamperes liberating chlorin ions from the negative pole for 15 minutes was used. Also the spots were touched with 20 per cent argyrol solution and a peroxid gargle was ordered. July 27, patches entirely gone and patient stated that he "felt 50 per cent better." This acute case was the most striking in the promptness with which it yielded to treatment of any observed. Ionic treatment, with occasional touching of the throat with argyrol (a few isolated new spots subsequently appeared) was continued until the patient died. He was able to eat until the last day of life without discomfort.

Case XI: —, ordinary seaman. Reported August 12 with advanced pulmonary condition, severe angina, accompanied by infiltration (and probably ulceration) of the larynx. A most hasty and unsatisfactory examination was made on account of the extreme illness of the patient. Ionic treatment gave relief, and under date of August 21 a note appears regarding his throat condition "continuously and remarkably improving." After August 25 patient was confined to bed, dysphagia became marked, and both internal laryngeal nerves were infiltrated with alcohol. This measure brought only moderate relief, and considerable distress was experienced during the last two weeks of life.

Case XII: —, apprentice seaman. On account of the prompt reaction of the upper air passages in case *X*, this case was referred for treatment, although it was a clear case of double peritonsillar abscess. A positive electrode of zinc sulphate (2 per cent) and a negative electrode of sodium chlorid (5 per cent) furnished ions liberated by a current of 175 milliamperes for 10 minutes. A great quantity of thick, mucopurulent secretion was at once discharged, and the patient experienced great relief during the next 2 hours. Only one treatment was given, the abscesses rupturing spontaneously on the second day thereafter.

While the results of this treatment thus far do not warrant extravagant claims for it, it surely seems that the legend which Trudeau says might be placed over the doors of modern tuberculosis sanatoriums could with equal truth be inscribed above our nose and throat room: "Cure for some, relief for many, comfort for all." For while it is too early to say that any have been permanently cured, yet every case treated has been relieved and all have been made quite comfortable.

COMPOUND COMMINUTED FRACTURE OF SKULL.

By T. W. RAISON, Passed Assistant Surgeon, United States Navy.

This case is reported as showing how, under very unfavorable conditions, an extensive traumatism, usually considered immediately

fatal, may have no serious aftereffects, and the advantage of immediate operation in cases of fracture of the skull.

At the time of the operation, which was begun within 20 minutes after the reception of the injury, the *Maine* was pitching considerably, and especially was this felt in the operating room. The operating room on the *Maine* adjoins the sick bay, the latter compartment being located in the eyes of the ship on the berth deck. The absence of infection indicates the efficiency of the iodine method of sterilization.

Case report.—August 24, 1914. — (coal passer). Compound fracture of skull. Duty. About 1.40 p. m. this date a filled ash bucket, weighing about 125 pounds, jumped from the hook at the top of the ash hoist and fell down the hoist about 40 feet, striking patient on vertex of skull as he was leaning over in fireroom, causing a compound comminuted fracture of skull. Patient was found lying on floor plates in fireroom in a pool of blood, being supported by one of the crew, with a large bunch of cotton waste held to the back of his head in an effort to check the hemorrhage. No pulse could be detected at wrist, pulse slow and feeble at carotid, respiration very shallow, and a condition of great shock and collapse was present. He was carried to operating room immediately and atropin sulphate 0.0006 gm. hypodermically administered. The hair was carefully clipped away from wound. Examination showed a depressed fracture; the external wound extended about $2\frac{1}{2}$ inches from the sagittal suture on the left to about 2 inches from the sagittal suture on the right; inferior border of wound was $1\frac{1}{2}$ inches above theinion, the superior border about 2 inches above this, with oval-shaped depression; no retraction of skin margins. Hair, coal dust, and fragments of bone were ground into the wound. Sharp hemorrhage from wound was venous in character. Dry sterile gauze pad was put over wound. Patient was prepared for immediate operation by shaving scalp.

Operation.—Two coats of $3\frac{1}{2}$ per cent tincture of iodine were applied to wound margins and over wound. Scalp was incised 1 inch either side of wound, bleeding vessels in scalp caught up by hemostats, flaps turned back either side of wound, and blood clots washed away with a gentle flow of hot salt solution, allowing a free inspection of wound. Skull was found depressed to about 1 inch below the surface of the skull, posteriorly a fragment of both plates driven down, holding a flat piece of bone about a half inch in breadth in the depth of the wound. Many small fragments of bone were in wound. De Vilbiss and rongeur forceps used to cut attached fragments of perpendicular plate from rest of skull and this was removed. Depressed pieces of bone were elevated and removed. The brain immediately expanded and slight pulsation could be detected.

About 25 small fragments of bone were removed from wound and all sharp edges of skull trimmed. Two slight tears were found in dura and one vessel torn; two sutures were placed in dura, ligating vessel and closing rents. Tube and gauze drain were placed in wound and scalp sutured over drain. During the operation, on account of the low-tension pulse and extensive loss of blood prior to and during operation, estimated about 1,500 cubic centimeters, 1 pint of normal salt solution was administered by hypodermoclysis; after operation 1 pint of normal salt solution given by rectum. He reacted well from operation, pulse 84, and better tension. He was somewhat restless during night; small quantities of water were given by mouth.

August 25, 1914.—Partly rational. No paralysis discovered. Very thirsty. Urine partially suppressed, 150 cubic centimeters, after 18 hours, removed by catheter. Two involuntary and one voluntary bowel movements. Pulse, 72; respiration, 18; temperature, 98.4° F. by axilla. Urine high colored, no albumin, loaded with phosphates. Memory is impaired, otherwise no symptoms except headache and general soreness. Slept about five hours during the night. Six hours after catheterization passed 760 cubic centimeters of urine voluntarily, and from thereafter had no further trouble in passing urine. Placed on hexamethylamin 0.6 gm. every three hours. Given calomel 0.18 gm. in divided doses. Albumen water every four hours.

August 26, 1914. Dressing soaked through with serum, redressed, drains removed, and a rubber-dam tissue drain inserted. Wound healing nicely. Brain pulsating synchronously with pulse. Systolic blood pressure, 120; diastolic blood pressure, 90. Put on liquid diet.

August 29, 1914. Convalescing; sutures removed; no infection at any time. On soft diet. Memory has gradually returned, no diminution in mental faculties discovered; no trace of any paralysis, motor or sensory. Wound has been redressed daily, smaller and smaller drains being used, and wound gradually closing at angles.

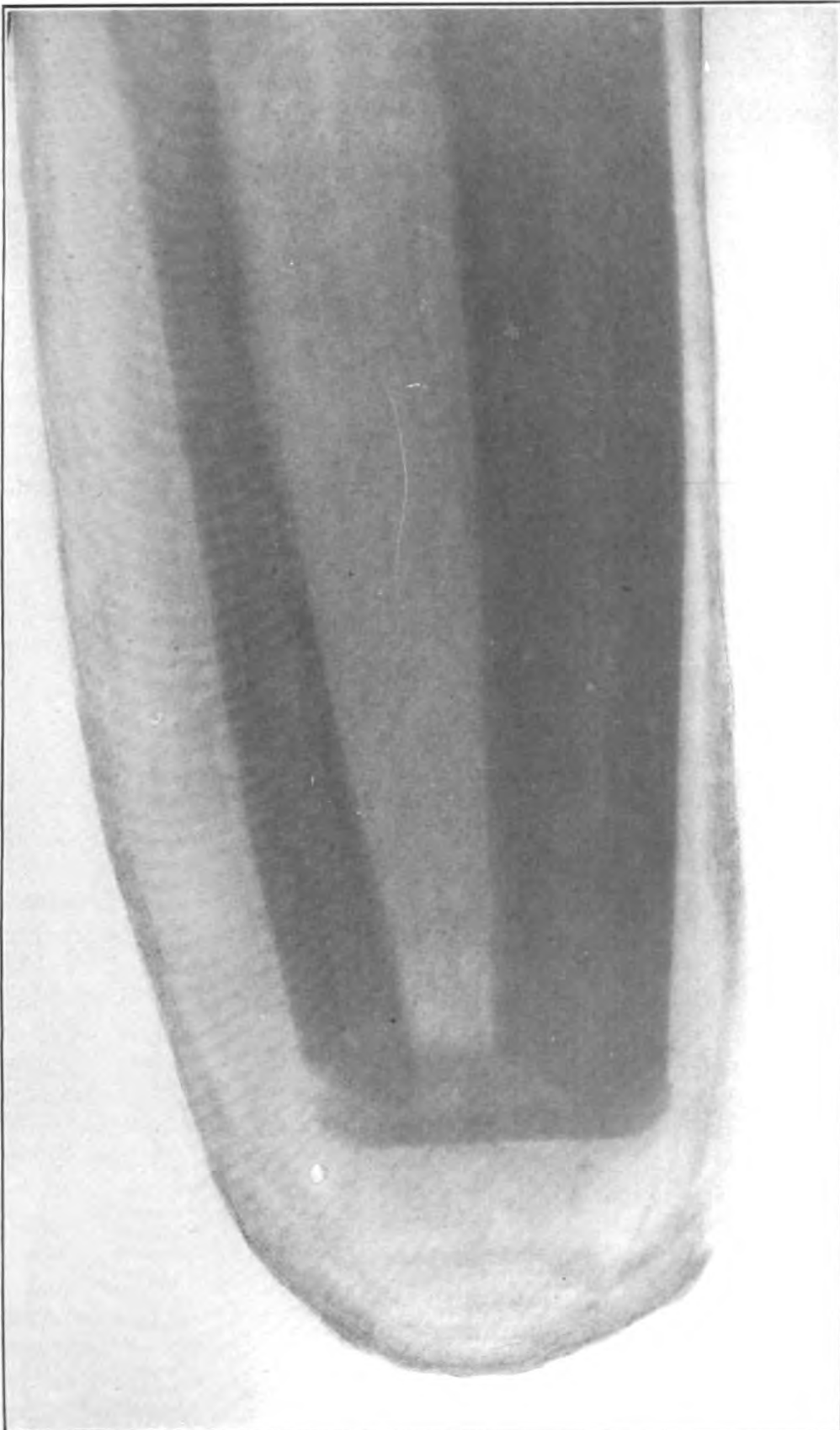
September 2, 1914. Transferred to United States Naval Hospital, Annapolis, Md., for further convalescence. It was desired to exhibit X-ray plates showing extensive nature of lesion and removal of oval piece of skull 3 by 1½ inches. It was impossible to secure these, however.

A CASE OF REAMPUTATION OF THE LEG.

By R. SPEAR, Surgeon, United States Navy.

— (coal passer), age 30 years, lost his right leg in the lower third by being run over by a car in March, 1909. The parts were trimmed up, and later the leg was reamputated, but the stump never healed. Both bones being too near the surface, the leg was painful and

Spear—Reamputation of Leg.



OSTEOPLASTIC FLAP.

useless. A reamputation was performed by the osteoplastic method and an excellent result was obtained. The patient could bear his weight on the stump without the slightest discomfort.

This case serves to illustrate the fact that when possible the best stump of a leg can be obtained by placing on the bottom of it a true flap covered with undisturbed periosteum and skin. The anterointernal flap in this case was the long flap. It covered the ends of the sawed bones and contained the piece of tibia.

If it is not possible to secure a skin and bone flap together internally, the bridge of bone and periosteum can be swung from the tibia from within outward and then covered and held in place by a muscle and skin flap taken from the outside of the leg.

A point to be remembered in the performance of an osteoplastic flap is to remove sufficient bone from the proximal portion of the flap to allow the bone to be swung into position without tension. It is a good plan to hold the bone flap to the fibula by means of a kangaroo or chromic gut suture passed through drilled holes.

TENOPLASTY FOR CONTRACTURE OF HAMSTRING TENDONS.

By R. R. RICHARDSON, Surgeon, United States Navy.

—, boatswain's mate, first class, age 30, was admitted to hospital October 9, 1909, as with "arthritis gonorrhoeica." Origin: Not in line of duty, sequel to a severe gonorrheal infection with which patient had been suffering during past six weeks. Both shoulders, elbows, knees, and ankles were swollen, stiff, and painful. All active symptoms of gonorrhea had subsided. Joints were kept at rest with counterirritants and bandages applied to them. No facilities were at hand for hot-air applications. Constitutional treatment was also instituted.

November 9. Inflammation, which had subsided, has now started up anew in shoulders. Local applications of lead water and laudanum to same.

November 16. Both knees and ankles are stiff and sore, acute inflammations having all subsided. All large and some of small joints are chronically inflamed and stiffened. Constitutional and local treatment continued.

January 11, 1910. Inflammation has subsided in all joints and they are all freely movable except left knee, which is still chronically inflamed and the hamstring tendons of which are contracted, preventing extension of the leg. Bier's hyperemia treatment, massage, etc., were used on affected knee.

January 18. Under general anesthesia (ether) and with the usual aseptic and antiseptic precautions, subcutaneous partial tenotomy of

left hamstring tendons was performed for cure of the contractures. Leg was extended and dressings with posterior splint applied to leg and thigh. Recovery from anesthesia was uneventful, with no nausea or vomiting.

January 21. Plaster cast was applied from middle of thigh to ankle (left side).

February 11. Cast was removed from leg. Complete extension and flexion to 90° is secured without difficulty. Leg is to be massaged and passive movements carried out daily until joint is freely movable.

March 4. Much better; continued. Has slight toe drop.

June 27. Patient is steadily gaining strength in leg.

July 4. Doing well. Has applied for light duty ashore and is able to perform such duty.

July 15. Discharged to duty. Patient's request for light duty approved. He has almost complete restoration of function in leg.

Patient is still in the service and has recently (Nov. 3, 1914) informed me that his "leg is as good as it ever was," and that he is capable of performing all his duties without any difficulty.

Remarks: Okinczyc in the *Journal de Chirurgie* (Paris, July, 1914), under "Operative treatment of ankylosis of the knee of gonococcal origin," says he has been able to find only 18 cases on record of operative treatment of ankylosis of the knee of gonococcal origin, including Murphy's two cases, and the ultimate outcome is known in only five. Even in these the results of treatment were generally poor, so that there is little evidence to encourage operative interference unless the knee is severely crippled by the ankylosis, or when both knees are affected, or, with incomplete ankylosis, there is pain when the leg is used.

In the case reported above the fibrous ankylosis of the joint due to contracture of the hamstring tendons followed an acute gonorrheal inflammation of the joint with the involvement of the surrounding tendons, fibrous tissue, etc., in the exudate. Although this was not a true case of bony ankylosis, it was a case of fibrous ankylosis with loss of function and caused the same disability as a true bony ankylosis would have caused. In addition to cutting the hamstring tendons, the posterior capsule of the knee joint had to be broken down before the leg could be extended.

NEOSALVARSAN AND MERCURY IN UNILATERAL LUETIC PALSY OF ABDUCENS.

By S. WALKER, Assistant Surgeon, Medical Reserve Corps, United States Navy.

Mr. — came to me complaining of diplopia which had been present and gradually becoming worse for about five months, and which had caused him to give up his occupation as a motorman.

Various forms of treatment in that time had been of no avail. The patient is a robust man of 36 years, and other than a luetic infection 12 years ago has never had a sick day. He has been married for some years, and wife is well but without children. Examination revealed the following:

Vision both eyes, 20/25.

Pupils react to light and accomodation. Ophthalmoscopic examination negative.

Left eye; convergent squint of 21° (perimeter).

Muscular movements apparently free in all fields except left externus not quite so active as rest. Rotary movements good.

Eyelids droop slightly, suggesting ptosis, but is apparently normal to him.

Head: Nose, ears, and mouth negative, except slight rash about face.

Neck: Negative.

Chest: Lungs and heart negative.

Abdomen: Negative.

Extremities: Knee jerks normal. No Babinski and no ankle clonus. No evidence of an unsteady gait.

Laboratory examination—Urine: Few shreds, otherwise negative. Blood: Red blood count, 4,800,000; leucocyte count, 8,200. Wassermann positive. Dr. Dakin.

Patient was given 0.9 gm. neosalvarsan subcutaneously preceded by morphin sulphate, gr. $\frac{1}{4}$.

The injection was followed by severe pain in back and limbs, with slight temperature for 36 hours. Thirteen days later, 0.9 gm. neosalvarsan was injected. Reaction was not so severe as previous. At this time sodium iodid grs. xxv t. i. d. was started, increasing gr. x daily until 200 gr. t. i. d. was reached, and then the procedure was repeated. Eleven days later mercurial inunctions were started. In 3 days after starting inunctions a marked improvement was noticed, and in 10 days the left eye was apparently straight. Severe pain was present over left orbit. At this time his diplopia disappeared in the morning and would return late in the afternoon.

Test with Maddox rod at this time showed an esophoria of 12° . Two weeks later patient stated he had noticed no diplopia for whole days at a time, but later would have days in which diplopia would come on at noon.

Strychnin gr. $\frac{1}{20}$ t. i. d. was now prescribed and mercury and iodids were reduced one-half.

Later examination shows about 7° esophoria which he overcomes without any trouble for a time. The question arose as to whether the improvement would keep up until there would be very little or

no esophoria, and whether we could hope to keep that condition without any relapse.

After watching the case at intervals for two months, the diplopia apparently entirely disappeared and only 1° — 2° esophoria were found with the Maddox rod.

Six months later there has been no return, and he has been working steadily. I might state that he passed his eye examination as a street-car motorman with no trouble.

A short review of the recent literature gives very little as regards effect of neosalvarsan on palsies of this type, especially of the unilateral abducens. Some claim that this type is usually followed by tabes later on. I am aware of that fact in the case of the third nerve, but am at a loss to verify such a future prognosis as regards the sixth.

As regards the site of the lesion. In all probability it was present near the site of exit of the abducens in the sphenoidal fissure or along its course after leaving the skull. Otherwise the probabilities are that it would have involved one of the other nerves because of their close relationship before piercing the skull, especially in the region of the fourth ventricle.

EDITORIAL COMMENT.

SOUTHERN MEDICAL ASSOCIATION.

The following resolution was adopted at the recent meeting of the Southern Medical Association in Richmond:

"Since the study of tropical diseases and the discussion of the problems of preventive medicine are among the most important functions of the Southern Medical Association and are much the same as those of the physicians connected with the United States Public Health Service, the United States Army, the United States Navy, and the sanitary department of the Canal Zone; and since the cooperation of the men connected with those departments of the Government have added greatly to the success of this and former meetings and their cooperation in the future is greatly to be desired, the council recommends that the physicians connected with the United States Public Health Service, United States Army, the United States Navy, and the sanitary department of the Canal Zone be elected members of the Southern Medical Association, and that their dues shall be remitted each year, but the Journal is not to be sent except upon payment of the regular subscription of \$3 per annum."

THE WILLIAM A. HERNDON SCHOLARSHIPS, UNIVERSITY OF VIRGINIA.

These two scholarships are established under the terms of the will of Dr. Cumberland George Herndon to defray all necessary expenses of the medical education at the University of Virginia of young men who signify their intention of entering the medical service of the Army or Navy of the United States and are unable to defray the expenses of their medical education except by borrowing or by doing outside work during the session.

The income of the fund is divided between the two scholarships and amounts to approximately \$425 to \$450 each annually. The scholarships do not carry free tuition nor remission of any university or laboratory fees. They are awarded as they become vacant.

Further information concerning these scholarships can be obtained by addressing the committee on Herndon scholarships, University, Va.

Cumberland George Herndon, medical inspector, United States Navy, was placed on the retired list December 15, 1905, and died May 5, 1911.

PROGRESS IN MEDICAL SCIENCES.

GENERAL MEDICINE.

G. B. CROW, Passed Assistant Surgeon, United States Navy.

RIESMAN, D. **The diagnosis and treatment of cholecystitis.** *Therap. Gaz., N. S.* XXX, No. 11, November, 1914, p. 773.

The gall bladder can be removed without noticeable harm to the body; nevertheless it fulfills certain functions, the chief of which are—that of reservoir; that of tension reliever to the common, hepatic, and pancreatic ducts; and that of generator of a protective mucus.

Cholecystitis is due to bacterial infection; but the pathway of infection is still a matter of discussion. Riesman thinks it probable that the bacteria reach the gall bladder with the bile, direct from the liver, this organ excreting the bacteria brought to it by either the portal or systemic circulation. For bacteria of the typhoid group, bile is a good culture medium; this accounts for the large number of typhoid carriers and predisposes to gallstone formation. The most frequent association of cholecystitis is with gallstones. These interfere with drainage and also cause irritation. In the majority of cases when a gallstone exists something will happen sooner or later. It may be an attack of biliary colic; obstruction of the cystic or common duct, pancreatic disease or cholecystitis.

Noncalculous cholecystitis is, however, comparatively frequent. As an acute condition it may occur as a complication of typhoid, septicemia, pneumonia, food poisoning, or other infection. It may be catarrhal and so mild that it passes unnoticed, or it may be severe, resembling an attack of biliary colic.

The symptoms of the acute attack are pain, tenderness, and swelling in the region of the gall bladder with rigidity of the right rectus muscle and leukocytosis. Usually it is possible to make out some enlargement of the liver, and on careful palpation the gall bladder may be felt. Jaundice will occur if, in addition to the cholecystitis, there is inflammation of the small biliary channels—cholangitis. Probably in many cases a localized protective peritonitis is developed. In severe cases the symptoms are identical with those of calculous cholecystitis; so it is not always safe to state positively that gallstones are present, as the operation may not show them. If the patient is in middle life and has had a similar attack, or has had typhoid or a similar infection, gallstones are probably present.

Cholecystitis in elderly persons is not very rare, but may pass unrecognized, often being called ptomaine poisoning. There is a history of an indiscretion in diet followed by a sudden attack of epigastric pain with nausea and vomiting, prostration, and fever. On the second or third day an enlargement in the liver region with marked tenderness on pressure is present. Chills and hypostatic congestion of the lungs may occur, but Riesman has not seen jaundice in such cases. For several days the right upper quadrant remains tender and the stomach continues irritable. Then gradually the symptoms subside; but for a considerable time a tender point below the margin of the ribs on the right side can be detected.

Acute forms of cholecystitis may readily be mistaken for appendicitis, perforated gastric ulcer, or uremia.

The acute catarrhal forms, whether accompanied by stone or not, usually yield to medical treatment. Heat or cold may be applied externally, urotropin and sodium salicylate internally. The patient should drink freely of water. The best diet for the first few days is buttermilk in small quantities. If the attack assumes the proportions of a biliary colic, the use of morphin can not well be avoided. The patient should be kept in bed until the acute symptoms have subsided, and for a long time thereafter he must avoid exposure to cold, fatigue, cold drinks, and rich dishes.

Riesman prescribes a capsule composed of—

Sodium salicylate.

Sodium succinate.

Ox gall \bar{a} \bar{a} 2.0.

M. et div. in capsul. XII. Sig. One 3 times a day.

If a laxative is necessary, sodium phosphate or Carlsbad salts in hot water may be employed.

Operative treatment is indicated in all cases of suppurative cholecystitis; in recurrent attacks that incapacitate the patient, and when there is evidence of blocking of the cystic or common duct. We ought to be more ready to refer such cases to the surgeon, knowing that long-standing flatulent or nervous dyspepsia, chronic pancreatitis, acute pancreatitis with fat necrosis, acute empyema of the gall bladder, diabetes, and cancer are possibilities hanging over the patient's head.—(L. W. JOHNSON.)

OSTHEIMER, M. The duration of infection in scarlet fever. *Pennsylvania Med. Jour.* XVIII, No. 2, November, 1914.

Desquamation of the hands and feet occurring some weeks after an illness with fever and sore throat is usually due to scarlet fever; but desquamation resembling that of scarlet fever may be due to injection of antitoxin or other serum; administration of quinin,

mercury, belladonna, salicylic acid, antipyrin, opium, or chloral; infectious processes such as rheumatism, toxemia, septicemia, malaria, typhoid, measles, chicken pox, smallpox, or vaccina.

Infectivity may persist for months, usually associated with pathologic processes in the nose, throat, or ear. The secretions of the nose and throat are probably the chief sources of infection. A scarlet-fever patient is infectious at least until primary desquamation has ceased and so long as there persist discharges from the mouth, throat, nose, ears, suppurating glands, abscesses, or open wounds. The occurrence of return cases proves that a convalescent scarlet-fever patient may remain infectious or may again become infectious. Therefore, it is correct to say that it is impossible to tell how long a scarlet-fever patient may remain infectious.—(L. W. JOHNSON.)

Diphtheria mortality with and without the use of antitoxin. Annual Report of the Boston City Hospital, Boston, Mass., for the fiftieth year, 1913-14.

One's keenest attention and interest in the great benefit derived from the discovery and use of diphtheria antitoxin are at once attracted and aroused by the impressive information strikingly presented by the charts published under that section of this report headed "South department."

This department, which was opened in 1895, admits and treats only the contagious diseases—diphtheria, scarlet fever, and measles.

Chart A shows graphically by two curves in such a pronounced way as immediately to catch the eye, the marked difference in the mortality of diphtheria cases, both from the disease and from intubation, before and after the advent of antitoxin.

Comparing the curves of Chart A with the figures of Chart B, it appears that during the period of years from 1888 to 1894, inclusive, without the use of antitoxin there was a mortality varying between 46.07 per cent and 48.44 per cent, usually being above or about 45 per cent, and only for two years was it as low as 36.88 per cent and 38.10 per cent, the average being 43.20 per cent.

During these seven years intubation also was more frequent and necessary, and was followed by a mortality varying between 78 per cent and 86.15 per cent, and which during five of these years was between 81.25 per cent and 84.94 per cent. The average for the seven years was 82.49 per cent.

In 1895, with the advent and use of antitoxin, the mortality fell at once to 14.22 per cent, continuing downward for the next four years to 9.99 per cent, then rose during the next four years to about 11.50 per cent. Since 1904 the mortality has been always below 10 per cent, the average being 8.48 per cent.

During the years 1895 to 1913, inclusive, the mortality from intubations fell by lysis from the highest, 64.73 per cent in 1896 (the year following the advent of antitoxin), with a pronounced drop in 1899 to 32.81 per cent, near which it remained until 1904, when the curve sweeps downward to 15.58 per cent in 1911. In 1912 the mortality from intubation began again to rise to 22.97 per cent and 1913 to 27.73 per cent.

Chart C shows graphically by columns the ratio of mortality per 10,000 of the population in Boston from 1877 to 1913, inclusive. This ratio varied between 13.5 in 1877 and 22 in 1881, and between 6.5 and 16 and the last great ratio of 18 in 1894.

In 1895 the South department was opened, and "it will be noticed that since that time there has been a marked diminution in the death rate not only of all types of diphtheria, but also intubation cases."

	With antitoxin.		Without antitoxin.	
	Year.	Per cent.	Year.	Per cent.
Highest mortality.....	1896	14.61	1893	48.44
Lowest mortality.....	1910	6.83	1890	36.88
Ratio per 10,000 of population.....	1895-1913	4.46	1888-1894	13.87

The percentage of recoveries from 1888 to 1894 was 17.50, whereas the percentage of recoveries from 1895 to 1913, inclusive, was 68.95.—(W. E. EATON.)

THOMAS, B. A., and IVY, R. H. *Observations on the Wassermann reaction.* *Am. Jour. Med. Sc.*, July, 1914.

These are made upon the results obtained at the Polyclinic Hospital, Philadelphia. Attention is called to the great variations in the technique of the Wassermann reaction as used at present, accounting for discrepancies in reports on the serum of the same patient by different workers. Several factors may cause this. In the titration of complement many of the negative results are due to the employment of overdoses of complement and hemolytic amboceptor.

In reporting results most workers employ + signs to indicate various percentages of inhibition of hemolysis, as 1+, 2+, 3+, and 4+, the last meaning absence of hemolysis or absorption of all complement used. Obviously this takes for granted that all 4+ reactions are of equal strength, but it only indicates the strength of the reaction up to absorption of one hemolytic dose of complement. It is better to state that reactions are negative, weakly positive, medium positive, and strongly positive, up to one unit of complement fixation and give the number of complement units absorbed in reactions stronger than this.

Accurate measurement of the amount of hemolysis can not be made by the eye alone and is not important in the majority of cases.

Another cause of disagreement is the employment of various substances as antigens. It is best to use syphilitic tissues as antigens instead of nonsyphilitic or synthetic products. This conclusion is made after 2,200 tests with syphilitic liver extract and comparison with cholesterinized extracts of guinea pig heart and human heart.

It is more difficult to render the serum negative by treatment to the cholesterinized extract. The latter always reacts more strongly and apparently gives a more delicate reaction than the extract of syphilitic liver, but many weakly positive results were obtained with the cholesterinized extract in nonsyphilitic cases. This offsets any advantage in delicacy. It is concluded that with cholesterinized antigens positive reactions are obtained in other conditions than syphilis and even in normal persons, and their use is a step backward in serological technique. With syphilitic liver extract weakly positive reactions mean nothing else but syphilis, and it is a very much less serious error to overlook an occasional case of syphilis than to saddle a diagnosis of the disease with all it entails upon a patient who does not have syphilis. A great many unfortunate people are being treated for syphilis who have not, and who never had, syphilis as a result of weakly positive and doubtful reports by workers using these antigens.

There seems to be great necessity for standardization of method.—
(R. SHEEHAN.)

MENTAL AND NERVOUS DISEASES.

R. SHEEHAN, Passed Assistant Surgeon, United States Navy.

EAGER, R. The rôle of hypnotics in mental diseases with indications for their selection and employment. Jour. Ment. Sc.

In a comprehensive article the writer has collected considerable valuable information upon this class of medication. It also gives results of considerable clinical experience and experimentation. The subject is handled under different headings, such as the necessity for sleep to maintain bodily vigor, which makes it more accessible. Loss of sleep is one of the commonest and most serious symptoms of mental disorder. It may be a causal factor or a symptom. Under the etiology, sleeplessness may be due to pain, acute fever, feeble circulation, or most any bodily disorder, or even a change of environment, and in the neurotic to emotional disturbances. It is essential to determine the cause, as in the predisposed comparatively trivial matters upset the balance.

One should fully realize the necessity of careful physical examination and of regarding the idiosyncrasies, and that special treatment

is indicated when relief is not speedily obtained for this distressing condition. If there is no removable physical or mental condition, there are such measures as hydrotherapy, massage, and suggestion available, aside from hypnotics; but it is often necessary to rely upon these. Hypnotics are medicines of varying composition and action which in administration produce effects as nearly as possible resembling natural sleep. Some are comparatively harmless in single doses, others exert powerful systemic influence. Some are cumulative, others habituating.

The considerations in the selection of a hypnotic as regards the patient are:

1. Age, which governs the size of the dose, and some hypnotics are contraindicated in childhood, others in advanced years.
2. Bodily condition. The state of the circulatory, renal, and respiratory systems should be considered, as where any of them are involved it is necessary to avoid taxing them.
3. Mental condition. Sleeplessness may accompany a great variety of mental states. It is frequent in melancholia, more so in mania, and common in paresis and senile psychoses.

In the choice of the drug there must be considered in its administration, the smell, taste, form, aftereffects, and rate of action. Some act quickly, others take four or five hours and may even last to the following day. The cost is important in institutional use.

Regarding the various hypnotics, of which the number is legion, only a few are considered.

1. Alcohol group: Alcohol, paraldehyd, amylene hydrate, chloral hydrate.
2. The sulphonal group: Sulphonal, trional, tetronal.
3. Meide group: Veronal, luminal, adalin.
4. The bromids.
5. Opium.
6. Hyoscin.

Alcohol.—In sleeplessness due to restlessness and insomnia, especially with lowered circulation and difficulty in maintaining body heat. The objection is cost and likelihood of habit formation.

Paraldehyd.—Valuable in cases of mild maniacal excitement. It is safe acting as a cardiac stimulant. It is least likely to form a habit. In 8 cubic centimeter doses by mouth it produces sleep in 30 minutes which lasts 5 hours. It is cheapest. It has a disagreeable taste; gives a disagreeable odor to the breath. Is contraindicated in respiratory involvement.

Amylene hydrate.—Closely allied to paraldehyd. Its taste and odor are not as objectionable and it is more powerful. Has no unpleasant residuals. It is six times as expensive; 4 grams produce five hours sleep after one hour.

Chloral hydrate.—Useful in cases of melancholia, especially if combined with bromids. It is habit forming. In doses of 1.2 grams it induces 6 hours sleep in 45 minutes.

Sulphonal.—Useful in cases of senile dementia and motor excitement of long standing. It is not a cardiac depressive, but may cause hemolysis and diarrhea with vomiting and arthralgia. It should be avoided in conditions where the secretions are deficient and the excretions impaired, i. e., melancholia. Its action is slow and cumulative. Two grams produce seven and a half hours sleep after four hours. Trional is similar to sulphonal but more rapid. It is said to be useful in chorea, but because of probable neurolytic effects is being discarded.

Veronal.—Is useful in early cases of mental disorder, especially those of the manic type. It is habit forming and has gained wide usage by the laity. Untoward symptoms resemble those of pneumonia, which condition may be diagnosed in acute veronal poisoning.

Veronal is best administered in milk a half hour before bedtime (formation of caseinate—R. S.). It is contraindicated in renal disease. In 0.6 gram doses it will produce 5 hours sleep after 45 minutes. Veronal sodium is quicker.

Luminal.—It is a very powerful hypnotic, which is useful in cases of intractable restlessness and excitement. It has produced sleep in 0.6 gram doses in cases where paraldehyd, chloral, and sulphonal all failed. Its sedative action is prolonged and it also acts in cases in which sleeplessness is associated with pain. It reduces the attacks in epilepsy where bromids fail. It is necessary to use 0.6 gram as a dose, which acts fairly rapidly, producing 10 hours sleep after 1½ hours with no bad effects. In 20 per cent solution hypodermically it will check the fits when everything else fails. In combination with apomorphin it is valuable in the delirium of alcohol. It is not habituating. It is expensive.

Adalin.—A little more effectual than the bromids, more tolerated, not a cardiac depressant.

Hyoscin.—A powerful depressant and exerts this effect on the heart. Contraindicated over middle age and in poor health.

Morphin.—Little or no use in maniacal excitement or in early mental trouble. Contraindicated in children, nephritis, and heart disease. Rapidly loses effect. Habituating. Valuable in sleeplessness due to pain.

Hypnotics should be given after the patient is in bed and under favorable conditions for sleep. They are most often necessary in maniacal excitement and next in senile dementia. Paraldehyd is best in the former class if not contraindicated. If so, veronal should be used. If this fails, luminal should be tried.

Most hypnotics, except morphin, are useless where pain is the source of sleeplessness. Luminal, however, seems an exception. Chloral will fail where pain is severe enough to prevent sleep.

Hypnotics should be avoided if sleep can be produced by other measures, especially the removal of the probable causes. Loss of sleep in itself is a sign of early mental trouble in many instances. Efficient nursing should accompany the use of all hypnotics. There must be no noise, the bed properly made, room well ventilated, and the light subdued. Attention to the bowels is important. No patient should be given a nightly hypnotic by routine. The patient's statement should not be taken as to the amount of sleep.

In prescriptions for hypnotics the number of times to be filled should be specified.—(R. S.)

WILLIAMS, E. M. **Hereditary ataxia.** *Am. Jour. Med. Sc.*, Sept., 1914.

In a report of two cases the writer briefly considers the various types of hereditary ataxia, spinal ataxic paraplegia, Friedreich's spinal ataxia, and Marie's cerebellar ataxia. In this group the exact differentiation is difficult, as they merge more or less.

His cases resemble most the type of Marie, but can not be placed in any of the groups, being atypical, presenting a spastic, springing, or bouncing gait with some ataxia, which is peculiar, as well as decided ataxia of the muscles of the face, tongue, and throat, as well as those of speech, and a late onset, all of which is unusual.

In Friedreich's ataxia the onset is usually before puberty, with a history of gradually developing and increasing clumsiness with choreic and occasionally athetoid movements, usually of the arms but often of the head, causing a purposeless nodding. Nystagmus occurs, speech is slow and drawling before the ataxia, and there is mental deterioration, but of less degree than in the cerebellar type. Sensory changes are absent or inconspicuous. The sphincters are unaffected. The patellar reflexes are absent and there is Rombergism, while scoliosis and deformities of the feet and legs may occur, which are rare in the other forms. Tremor and tachycardia happen, but are not characteristic.

In the cerebellar type, called Marie's, the symptoms are similar and the two forms may occur together; but in this there is evidence of the cerebellar involvement, the staggering gait, explosive, ataxic speech, and ataxia of the extremities. The onset is after puberty while spastic ataxia and paraplegia are absent or late and the ataxic speech, mental deterioration, and jerky tremors are more apt to be prominent. The patellar reflexes are preserved and, as a rule, active. The Romberg is not prominent typically.

In hereditary ataxias the spinal cord or cerebellum or both are congenitally undeveloped and besides the lateral and posterior columns are sclerosed in the Friedreich type, while in the Marie the findings are atrophy and sclerosis of the cerebellum.

Where the lateral columns are more affected early the case may be termed spastic, ataxic paraplegia, the speech defects and deformities being uncommon in these types, but these are really only a subdivision of the Friedreich group.

Like most hereditary diseases these ataxias are transmitted more often on the female side, and the family usually shows other stigmata, as epilepsy, insanity, imbecility. The disease is not amenable to other than symptomatic treatment and is steadily progressive, but occasionally showing retardation.

These atypical cases may closely simulate Huntington's chorea.—
(R. S.)

VALLEKAN and COZAUCH. *Psychic disturbances of dengue.* L'Encephale, vol. 1, p. 27.

In a very complete digest of the literature and a summarization of their own observations in a large number of cases these writers present a valuable article on a phase of this disease that is much neglected.

Dengue is a protean disease par excellence, and as an epidemic manifests itself with such a variable symptomatic concourse that it has many times led to errors of diagnosis. Certain symptoms predominate in one epidemic and may be nearly totally absent in another.

In the well-known treatises on tropical medicine little or no attention is paid to mental aberration as a complication of dengue. In various studies attention has been called to such facts as that "the convalescence is especially remarkable on account of the state of prostration." The cephalalgia is a constant phenomenon; it manifests itself from the beginning of the malady with great intensity and persists during the whole duration of the fever. In nearly all cases the insomnia is total, absolute. If the patients doze a moment, they are prey to dreams or nightmares, which throw them into great agitation. Delirium and hallucinations have been observed. In children there occurs a sort of comatose insensibility, alternating with an extreme agitation. Convulsions may then supervene, but they are always of little seriousness. There is always a state of lameness, a prostration, a sort of intellectual enfeeblement which serves to bear a relation to the violence of the cephalalgia and the articular pains of the initial period. The febrile excitation seems as lively as it is possible to be, especially when compared with the excitation that is

observed with the same temperature in other diseases. It is remarkable in children. There is absence of sleep, and when it exists it is broken, disturbed, and does not bring refreshment.

Delirium, while rare in the adult, is frequent at early ages. The child tosses in bed; wishes to rise. At times there are incoherent words or plaintive murmurs. A partial delirium with tendency to coma has been observed.

One symptom which is a peculiar characteristic of this affection is the extreme feebleness of the patients which the fever alone does not explain, because that may have been slight and of short duration without rendering the debilitation any the less marked. There is only one disease which produces under nearly similar conditions such a complete prostration, that is grippe.

This extreme debility transforms the most energetic natures; they are conscious of it but are not able to react.

Pronounced drowsiness with tendency to stupor is met with in children. This condition is very serious, for it leads gradually to coma and death results from it. Agitation and sleeplessness exaggerate the pains of the patients and give place in some cases to a tranquil delirium.

The convalescence which follows dengue possesses a peculiar character. The prostration and muscular feebleness are extreme, and whenever the attack was intense the complete recovery is long delayed. Many patients forget certain words or names, they confound facts. They are no longer in a condition to express their ideas in writing with regularity, they have logoplegia and agraphia.

The fever is accompanied by a most intense cephalalgia situated most frequently in the frontal and suborbital regions. The patient complains of a painful sensation of weight and of pain in the eyes. Insomnia is the general rule. The convalescence is of long duration, very uncomfortable, and nearly always out of relation to the intensity and duration of the febrile period. The patient complains for a long time of feebleness, of inactivity of the stomach, of vague pains in the back and limbs, of intense headache, and sometimes of vertigo.

In connection with alcohol, cerebral congestion, delirium, extreme agitation, and hallucinations are often observed. The analysis of cases has shown that dengue like other infections may cause mental complications, and if the psychoses are rare, this is not the case with the more elementary psychic disturbances.

Psychic disturbances are never seen at the beginning or early in the disease but only after the fever.

From the beginning of dengue two symptoms are never absent and are met with in all patients with greater or less intensity, headache, and insomnia. Headache is manifested from the first day of the

disease, reaching its maximum from the start. The pains, general and diffuse in some subjects, are localized in the greater part in a frontal, periorbital, or an orbital headache.

During the acute period the insomnia is nearly constant. It exists at the same time with a sort of somnolence. The patient is dejected but he does not sleep. He opens the eyes every few moments and complains of the insomnia.

At times the patient is agitated, he changes his position in the bed constantly, he speaks while he is sleeping, but the words are more or less imperfectly articulated, and the phrases confused. The physiognomy reflects the gay or sad nature of the mental operations. Again the patient remains motionless in his bed, dejected, absolutely indifferent to all that surrounds him. He responds with difficulty to questions, immediately falls again into somnolence, in a word manifests a state of torpor which often is not in proportion to the intensity of the fever.

In 586 cases examined during an epidemic there were never observed during the febrile period very emphasized psychic disturbances.

Convalescence from dengue is slow. It seems that after dengue the psychical and physical depression is much more pronounced than is indicated in the classical treatises on exotic pathology. The most predominant feature in the convalescent is the psychic asthenia. Nearly all the patients are dejected, discouraged, sad, and it seems to them that they will never recover from this disease; that they will not regain their strength. In some cases the asthenia is more pronounced; not only are they sad, dejected, and discouraged, but they remain inert, isolated from the exterior world, or troubled about the future. It seems that all sorts of misfortunes await them.

In certain cases the memory is affected, there is active amnesia or fixation from which there results an incapacity of applying themselves to any intellectual work.

In one case there was observed a sensation of change in the exterior world. He thought he could no longer perceive objects and things as before.

It is concluded that during the acute period of dengue and during the convalescence disturbances of the mental condition more or less severe supervene, are characterized from a psychic point of view by headache and insomnia, dreams, nightmares, hallucinations, amnesia, and intellectual torture joined with confusion.

These disturbances, which arise from the disease whatever may be its intensity and which are not attributable to any other pathological condition, such as alcoholism, for instance, may be elementary or accentuated into a psychosis.

This psychosis was always manifested in all the cases mentioned and in those observed under the form of mental confusion with hallucinations.

All types of mental confusion are met with in dengue. The agitated mental confusion seems more characteristic of the acute period, where it coincides with the extreme rises of temperature at the time of convalescence. The psychosis develops as a basis of psychic and physical asthenia and assumes especially the stupid type.

The fact that dengue is translated cerebrally by mental confusion in all its modes with hallucinatory delirium proves that there are in the disease psychopathic toxi-infectious characteristics. These differ in no way from those which are observed in other states of intoxication or infection, which is not surprising, as all these conditions have the same delirious clinical formula.

Attention is called to the fact that in dengue as in grippe the phenomena of asthenia or apathy or torpor are particularly accentuated. These phenomena are even so emphasized that they become unconquerable somnolence, which suggests that somnolence or narcolepsy is a phenomenon of toxic origin, connecting with torpor, of which it appears to be the maximum degree and susceptible of being manifested in all the toxic infections where the torpor is extreme, like the sleeping sickness, which is a veritable type of this nature.—
(R. S.)

SURGERY.

A. M. FAUNTLEROY, Surgeon, and E. H. H. OLD, Passed Assistant Surgeon, United States Navy.

Medical arrangements of the British Expeditionary Force. Brit. Med. Jour., Nov. 14, 1914, p. 848.

Gas gangrene was prevalent during the period of the Battle of the Aisne, but almost disappeared after that battle. The causes for the prevalence as well as those for its relative disappearance are not satisfactorily explained, although the drier weather and the change from mud to a sandy soil in the later period are probably factors.

Tetanus infections also were numerous in the earlier period, but much less frequent at the time the article was written. Its appearance was irregular, cases not being grouped according to location or organization units.

The morale of the men is stated to be admirable and their physical condition, apart from their wounds, remarkable. Multiple wounds are the rule rather than the exception. Except when the thorax or abdomen has been penetrated there is commonly nothing in the patient's face to suggest a seriously injured man, and on removing

the dressings one is astonished to find how grave and extensive are the lesions. The amount of disease has been singularly small.

Septic infection of wounds has been due to the environment of the men at the time of receiving the wounds. The initial infection is of a special character, being due to a spore-bearing anerobic bacterium, which is present in enormous numbers and for some days prevents the growth of ordinary pyogenic organisms. These spore-bearing anerobes are present because the soil has for years been subjected to intensive cultivation with free use of animal manures, and with this soil the persons and clothing of the troops have been contaminated in digging and living in the trenches. Every wound is instantly and irremediably infected and the large shell wounds with extensive and irregular surfaces can not be cleaned of infection, at least for several days.—(L. W. JOHNSON.)

The home hospitals and the war. Brit. Med. Jour., Nov. 14, 1914, p. 854.

The proportion of shrapnel to rifle bullet wounds has been high, averaging quite 10 to 1. Most rifle bullets go clearly through and leave little to be desired from a surgical point of view. Slight suppuration at the points of entrance and escape takes place in perhaps 20 per cent. Cases of perforation of the lung have a cough for a few days, with expectoration of a little blood, and then go on to steady and rapid convalescence with little suffering.

One patient with a perforating wound of the abdomen, caused by a rifle bullet, reached the hospital after a journey of 72 hours. The abdomen was distended, rigid, and tender, and he had vomited many times during the journey; but his pulse and facial expression were not those of peritonitis. He was treated on expectant lines with abdominal fomentations which were sprinkled with belladonna liniment, and turpentine enemata, which caused the expulsion of much flatus and gratifying improvement followed.—(L. W. JOHNSON.)

POWER, D'A. The wounded in the war; some surgical lessons. Lancet, London, Nov. 7, 1914, p. 1084.

No extensive operations were undertaken to remove foreign bodies from the chest. By the time the patients arrived in London the wounds had healed without suppuration. When one side of the chest contained fluid it was treated as an empyema by drawing off the exudate.

Most of the operations for removal of bullets suppurred for a few days, but none dangerously. The operations were performed with the usual precautions and the suppuration was not due to a fault in

technique; so these cases were separated from the clean cases. Amputations were rare and there were no deaths. Gangrene, due to an anerobic organism, occurred in several cases. Early amputation has been performed with success and the very great value of free application of 2½ to 3 per cent solution of iodine in alcohol has been determined. It should be applied to the raw surface of the flaps at the time of amputation, and care should be taken to allow free drainage by not putting in too many sutures.

The size of the skin wound bears no relation to the severity of the injury. The lower jaw in one case was found to be so comminuted that it had to be removed with a Volkmann spoon, yet the skin wound hardly admitted a probe.

The war has revealed an interesting series of cases which Power terms "nerve concussion," and about the treatment and prognosis of these much is yet to be learned. Occurring in connection with the spinal cord, the condition may follow a blow from a bullet or piece of shell perhaps no nearer than upon the pack which the soldier is carrying. There is no external wound, but the man becomes paraplegic, a condition analogous to railroad spine, though not associated with neurasthenia. A similar condition of paralysis without any gross injury has been noticed in the arms and legs, apparently due to interference with the function of one or more nerve trunks. The mental state of the patient makes no difference in the rate of recovery.

As in civil practice, meddlesome surgery is generally bad surgery. Wounds need not be probed, drained, and packed. It is better to wait than to operate unless the patient is losing ground. Considerable experience is needed to know when to wait and when to operate, because injuries which appear slight superficially may conceal conditions that demand immediate treatment. Antiseptic surgery is preferable to aseptic methods. Dry dressings must give way to compresses and fomentations wherever possible. Iodine applications seem to be more effective than the solutions of perchlorid or biniodid of mercury. It is better to err on the conservative rather than on the radical side of surgery.—(L. W. JOHNSON.)

EISENDRATH, D. N., and SCHNOOR, E. W. The significance of the Jackson veil. *Ann. Surg.*, November, 1914.

This article is a report of observations made at the time of operation on a large number of cases, from dissections of cadavers, and from an examination of 10 fetuses. The summary of the article is as follows:

The parietocolic fold of Jonnesco, synonymous with the pericolic membrane of Jackson's veil, is a reduplication or fold of peritoneum,

which is constantly found during the fetal and post-natal life. This membrane corresponds in every way to the description given by Hall of Jackson's specimens in his two principal papers, published in 1908 and 1913, respectively. It is a fine translucent membrane, which varies greatly in vascularity. In some of the author's cases there were only a few fine capillaries, while in others the membrane was extremely vascular. The upper border of this right-sided pericolic membrane is almost invariably at the level of the hepatic flexure, and its lower border from one to one and one-half inches above the lower end of the cecum. In some of the cases the lower border either extended a little farther down and covered the entire cecum and a portion of the appendix or fused with the fold of Treves. In the great majority of cases this fusion did not occur. The vessels of the pericolic membrane are, as a rule, directed downward and inward. In two of the cases the membrane was as thick as ordinary cardboard, and showed practically no vessels. In the remainder of the patients the membrane was very thin. It extends inward across the front of colon to the attachment of mesocolon, and either fuses with the peritoneum covering the latter or fuses with the omentum along the upper third of ascending colon. These may be called normal cases, the membrane being a persistence of fetal structure, and under no circumstances should it be stripped off. Such a step would result in leaving an extensive denuded surface.

The authors conclude from an examination of their specimens and from observation on the living that the genito-mesenteric fold of Reid is the forerunner of the ileopelvic band of Lane, and bears the same potential relation to the Lane kink that the pericolic membrane bears to possible kinks of the ascending colon. That such constrictions occur one can no longer doubt. One of the authors' cases afforded ample proof of the rôle which the Jackson veil may play in the production of acute and chronic obstruction of the ascending colon and cecum. The authors, however, are not prepared to state at the present time what causes this change in the pericolic membrane from an innocent persistent fetal structure to the production of a pathological entity. Jackson, Pilcher, Gerster, Flint, and others have called attention to the various sequelae of such pathological changes in the pericolic membrane. The object of the authors' investigation was to call attention to the fact that there were two distinct types of pericolic membrane: (1) Those which are innocent, and (2) those which may cause mechanical interference with the function of the colon. Each case must be judged upon the operation findings, and one is not justified in saying that every pericolic membrane requires operative interference. The majority are perfectly normal structures.—(A. M. F.)

PHEMISTER, D. B. The fate of transplanted bone and the regenerative power of its various constituents. *Surg., Gynec. and Obst.*, Sept., 1914.

This highly instructive article, based on a number of experiments conducted by the Nicholas Senn Fellowship for Surgical Research, Rush Medical College, Chicago, represents what appears to be the last word, so far, in the progress of bone transplantation. All the experiments were performed upon dogs with bone from the same animal, as it has been sufficiently proven that bone from a different animal of the same species behaves in the same manner as that from the same animal, but with somewhat diminished powers, and that a transplant from a different species acts the same as dead bone or any other foreign body.

Phemister's conclusions are summed up as follows:

Osteogenesis in bone repair occurs from the inner layer of the periosteum, from the endosteum, and to a much less extent from bone cells and fibrous contents of the haversian canals. Viability of the cells of the transplant is dependent largely upon their ability to get nutrition and, to some extent, upon their degree of cell specialization. Periosteum and endosteum, being superficially located, receive sufficient nourishment to survive and proliferate. The great mass of bone cells, being away from the surface and surrounded by an extensive, difficultly-permeable calcified matrix, gradually undergoes necrosis and absorption. A few about the periphery and lining the larger vascular spaces, as well as the fibrous elements of the latter, may survive and proliferate. Blood-forming cells of the marrow, despite their favorable nutrition and probably because of their greater degree of specialization, gradually undergo necrosis.

The subsequent changes which the transplant undergoes depend upon its composition and location. According to Roux's law of functional adaptation a transplant placed in a useful location—i. e., a bony defect—undergoes progressive changes, while one in a useless location—i. e., soft parts—undergoes chiefly retrogressive changes and is gradually removed.

Transplantation into a bony defect: Functional demand stimulates the surviving cells of the transplant to osteogenesis. Callus forms at either end, which helps unite the transplant and fragments. Creeping substitution of the dead cortex gradually occurs by the ingrowth of capillaries with dilatation of the haversian and Volkmann's canals, absorption of the old bone and deposition of the new bone in its place.

When periosteum and endosteum are left on, the transplant contains the greatest number of living osteogenetic cells. Consequently union between the ends and substitution of the dead cortex occurs most constantly and rapidly. When periosteum is removed, osteogenesis producing union and substitution occurs from the endosteum

and few surviving cells of the cortex, but the process is much slower than when periosteum is left on. When both periosteum and endosteum are removed new bone formation from the few surviving cells is slight, and union with the ends of the fragments and substitution of the dead bone are very much delayed. If such a transplant is cut into small pieces before implantation, more cells survive because of the increase in surface and facilities for nutrition and greater functional irritation. Consequently considerable callus forms from each piece and, fusing with that from the others and from the ends of the shaft, ossification of the callus proceeds from the surface of each piece and substitution of their dead portions gradually occurs.

Axhausen's claim that osteogenesis does not occur from transplanted bone devoid of periosteum and endosteum is incorrect. Equally erroneous is the old view of Barth, now advocated by Murphy, that there is no osteogenesis from any portion of a transplant, substitution occurring entirely by an ingrowth of new bone from the fragment ends.

Periosteum transplanted into ulnar defects and in subperiosteal ulnar resections failed to regenerate bone and restore the shaft, but in subperiosteal resections with reimplantation of cortex, either alive or after boiling, it formed a layer of callus about the reimplanted portion. Subperiosteal resection of the humeral shaft in the young was followed by regeneration of the shaft. Periosteum gets its chief impulse for osteogenesis, not from an injury to itself, but from the injured bone to which it is attached or intimately related and which demands repair.

Transplantation into soft parts: The same portions survive as in a bony defect, but since there is no functional demand for bone in this location little proliferation or substitution occurs and the transplant is gradually absorbed. Transplanted periosteum produces little or no new bone for the same reason. The presence of an infection, if severe, results in death and failure of the transplant; if mild, there is set up in it an osteomyelitis with excessive proliferation and absorptive changes, but the transplant takes and is functionally a success.—(A. M. F.)

LEVISON, C. G. A plea for the immediate operation of fractures. California State Jour. Med.

The author considers that there is no longer any dispute in regard to the open treatment of fractures, but only as to whether the operation should be performed immediately or be delayed.

Such an operation should not be performed by anyone whose technique is not absolutely perfect.

Opponents to immediate operation hold that five or six days should elapse to allow plugging of lymphatics.

Levison considers that immediate operation is indicated on account of the ease with which the fragments can be brought into apposition at this time, before the blood that has escaped into the tissues coagulates and produces induration of the muscles and soft parts.

Immediate operation should be performed only on fractures caused by indirect violence; not on those complicated with traumatism to the tissues.

Treatment of compound fractures: Operative interference is contraindicated in this class of fractures. Even if reduction is not possible, operation should be delayed for at least 15 days. He considers that the wound should be allowed to heal entirely, and the operation can then be performed in the usual way without danger of infection. A compound fracture should never be explored; neither finger nor instrument should ever be introduced in the wound.

Indications for operation: Under this heading it is mentioned that operation is not advocated for every fracture, but only for those that can not be treated in the usual way. There is no table given of the types of fracture calling for operation in his opinion, but mention is made of femur and tibia and the time and annoyance saved the patient, in addition to the much better approximation of the fragments.

Time of operation: Lane's practice of immediate operation is followed and is considered practically free from danger of infection when operation is carried out under perfect technique.

DETAILS OF TECHNIQUE.

1. Lane's dictum: "There should be no handling of the tissues whatever." Gloves should be worn, but fingers never introduced in the wound; all manipulation is done by instruments. No blood vessels are tied and, as the muscles fall together, no sutures are used. When suture material has to be inserted clamps are used for tying. The skin is brought together with Michel clips.

2. X ray: This is used for diagnosis in order to avoid traumatism by manipulation of fragments.

3. Hemostasis: This is not used in the majority of cases in order to avoid secondary oozing. Occasionally it is necessary to use the tourniquet, as in spiral fracture of tibia.

4. Skin disinfection: Dry shave. Scrub with a 1-1000 solution of iodine in benzine. Application of 5 per cent tincture of iodine.

5. *Skin protection*.—The skin is scratched with a needle along line of incision to be made. Sterile towels are then placed around limb and edges are fastened along intended line of incision by small

vulsella which are hooked to the skin. After the incision passes through the muscle fascia gauze pads are placed over the skin edge and secured to the fascia by vulsella.

6. *Length of incision.*—This is shorter when operation is performed immediately.

7. *Approximation and fixation of fragments.*—Plates should not be too thick; they are intended to act as splints and not maintain approximation by thickness and tensile strength. After the fragments are brought into position, and remain so without displacement, the plate is applied and is not subjected to any strain; this is the case in recent fractures. In fractures of the lower extremity the patient is placed on a pelvic elevator, with a perineal upright to act as countertractor, when traction is made on leg, and in this position a plaster cast can later be applied without possibility of disturbing fragments when lifting patient.

8. *Drainage.*—This should never be employed.

9. *Closure.*—The periosteum need never be sutured. The muscles fall together and do not require suture. The fascia if not sutured shows no tendency to cause widening of the scar. The skin is closed with clips. Sterile dressings applied and plaster cast over all.—(E. H. H. O.)

HYGIENE AND SANITATION.

C. N. FISKE, Surgeon, and R. C. RANDELL, Passed Assistant Surgeon, United States Navy.

NORTON, J. F. Study of a swimming pool with a return purification system. Am. Jour. Pub. Health, Vol. IV, No. 77, November, 1914.

Physical and bacteriological cleanliness in a swimming pool with somewhat limited water supply has been maintained and demonstrated by ample laboratory tests to be safe as well as satisfactory to the bathers, who, of course, are required to take shower baths before entering the pool.

"The Harvard tank at the Cambridge Young Men's Christian Association is 60 feet long by 20 feet wide, and varies in depth from $3\frac{1}{2}$ to 7 feet. The capacity is 55,000 gallons. The water is supplied by an artesian well on the premises about 400 feet deep, through a pump of 50 gallons a minute capacity. Around the tank, just above the water line, is a splashboard connected with the sewer except at the shallow end of the tank, where it serves as a trough to admit water to the pool. The outlet is in the bottom of the tank near the deep end. The purification system consists of a closed filter 6 feet high and $4\frac{1}{2}$ feet in diameter, filled with quartz pebbles, through which water from the tank may be pumped at the rate of 50 gallons per minute. This means a rate of 63,000,000 gallons per acre per day. In front of the filter is a by-pass, controlled by a needle valve,

leading through a cylinder filled with sulphate of alum. The alum is thus dissolved slowly and mixed with the main supply from the tank. The amount used varies from one-fifth to one-half grain per gallon. The filtration is carried on only during the daytime. The filter is cleaned each day by reversing the current. When necessary the filtered water is passed through a heating coil in order to keep the temperature of the tank as nearly as possible at 70° F.

"At night, after all users have left the pool and the filter is shut off, 1 pound of hypochlorite of lime is dissolved in the water by wrapping it in a piece of cheesecloth attached to the end of a pole, which is moved about the surface of the pool. The water remains quiet during the night. The first thing in the morning the sides and bottom of the tank are cleaned by a brush connected with a suction pump—an arrangement similar to the ordinary vacuum cleaner. Then enough water is added from the well, usually about 5,000 gallons, to replace that lost by splashing the day before and by the cleaning process."—(C. N. F.)

ALBERT, H. The period of incubation of diphtheria cultures. *Am. Jour. Pub. Health*, Vol. IV. No. 8, August, 1914.

Cultures forwarded by mail to the Iowa State laboratory, as would be expected, showed an increasing proportion of positive growths at end of 8 hours' incubation as the outdoor temperature became warmer from March through April and May. Out of 383 cultures which proved to be positive at the end of 24 hours' incubation, 44 were found by examination to be positive at end of 8 hours' incubation and 111 at end of 12 hours. While cultures from suspected throats in the naval service are usually incubated at once, the above experience indicates that it is worth while to examine cultures earlier than the generally accepted 18-hour incubation regardless of the macroscopic appearance of growth.—(C. N. F.)

BEYER, H. G. Subsistence on board battleships. (*Die Ernährung an Bord von Kriegsschiffen.*) Abdruck aus *Handbuch der Gesundheitspflege auf Kriegsschiffen*. Verlag von Gustav Fischer in Jena.

The newly issued (1914) Handbook of Hygiene on Battleships consists of two volumes of 1,638 pages. Section VI of Volume I has been ably presented by Medical Director Beyer, United States Navy, under the above heading, with a supplement on the alcohol question in the Navy.

The subject matter is treated in 10 subheads: 1. The personnel, supervision, and responsibility of those directing the commissary

department; the system of messing, embracing a description, with illustrations, of galley, bakery, issuing room, meat room, and scullery; and a description of the detail and duties of messmen. 2. Physiological importance of foodstuffs to the animal body, and intrinsic and extrinsic conditions that affect their proper assimilation. 3. The values, physical characteristics, and, in the case of meats, slaughtering—of (*a*) animal foodstuffs and their derivatives; (*b*) vegetable foodstuffs (including bread and its preparation, description of potato-peeling machines, etc., and fruits); (*c*) alkaloid-containing materials; and (*d*) alcohol-containing materials. 4. Canteens and bumboats. 5. Mess gear. 6. Cost of ration for sick. 7. Subsistence of prisoners. 8. Care and preservation of foodstuffs, including discussion of cold storage and artificially preserved meats and animal products. 9. Tables of food values and costs. 10. Numerous ration tables of the various navies of the world.—(R. C. R.)

PHELPS, E. B. *The chemical disinfection of water.* Pub. Health Report, Oct. 9, 1914.

Only three agencies proposed for the chemical disinfection of water have proved satisfactory—i. e., ozone, hypochlorite of calcium, and gaseous chlorin.

“Ozone has had an extensive development in Europe and will undoubtedly be more widely used as the electrical and mechanical features of the process are better understood and worked out. It is undoubtedly efficient when properly applied, but mechanical imperfections and the high cost of operation have thus far delayed its adoption in this country.

“The gaseous chlorin process is of recent introduction and as yet is not generally known. It is covered by general process patents, and the various mechanical devices necessary in its application are likewise controlled by a few companies engaged in installing plants. Although there is but little published information upon its use, the indications are that it is cheap and efficient.”

The hypochlorite process is in general use in this country, and the agent, commercial “bleaching powder” or “chlorid of lime,” is active even when highly diluted. It should contain not less than 33 per cent available chlorin. Market prices average 1½ cents per pound. The method is so simple that for small plants the ingenuity of the average individual should suffice to devise proper means of addition, but in any important installation the services of a qualified expert are almost indispensable.

“A few barrels, some piping, a toilet flush tank, and some bleaching powders are all that are absolutely required. Pending the in-

stallation of a better plant, the water supply of any community can be absolutely safeguarded within a few hours after beginning work. These may be called the first-aid remedies, after which the question of securing the services of an experienced waterworks engineer should properly come up for consideration.”—(R. C. R.)

WOODHEAD, G. S. *Sterilization of water supplies for troops on active service.* Lancet, London, Sept. 19, 1914.

The author describes a very compact outfit for rapid examination and sterilization of suspected water supply, depending on the liberation of free chlorin from hypochlorite of lime. Varying quantities of a test solution made from a 2-gram ampoule of the lime are added to 5 service cups or basins containing a fixed amount of water and then allowed to stand 15 minutes. Then to each is added a crushed tablet of iodid of potassium and one of starch. The formation of a blue, violet, or brown color in any one of the cups indicates that purification has been complete, that the chlorin liberated was more than sufficient to combine with the organic matter; what remained set the iodine free from the potassium iodid to combine with the starch. Then the contents of the original test solution are added to the service tank in the proportions needed.

The entire test and sterilization takes less than one hour.—(R. C. R.)

SANDWITH, F. M. *The Lettsomian lectures on dysentery.* Lancet, London, Sept. 5-19, 1914.

That portion of the lectures on the association of dysentery with wars is of particular interest at present. In the American Civil War the Federal troops lost 37,794 men from dysentery and diarrhea; at Andersonville these caused 50 per cent of the sickness and 58.7 per cent of the deaths from all causes. In the Franco-German War (1870-71) there were 38,652 admissions and 2,380 deaths from dysentery in the German Army. In the South African campaign (1899-1902) the English had 38,108 cases of dysentery, with 1,342 deaths. During the siege of Ladysmith, among the besieged there were 1,841 cases of dysentery, with 105 deaths. At Aldershot, in 1901, there was an outbreak of 170 cases, with 38 deaths. The Japanese in 1894 in their land campaign against China, developed the enormous number of 155,140 cases, with 38,094 deaths, a lesson apparently well learned, as evidenced by the wonderfully good results during their last war. In the recent war between Italy and Turkey, in Tripoli, and again in the Balkan campaign, dysentery was present among the troops, but no complete statistics have yet been published.—(R. C. R.)

GORGAS, W. C. *Antimosquito work at Panama*. Proc. Roy. Soc. Med., VII, 1914, pp. 31-39.

Legends, reports, fiction, have all impressed upon us for generations that Panama is death's lodging place. It is probable that more white men have died there in the last 400 years than in any one other place in the Tropics; probably, however, not so much from the fact of its inherent danger, as from the constant presence of numbers of unacclimatized whites, due to commerce, routes of travel, and construction.

The French commenced work on the canal in 1880, we in 1904. Think of the tremendous steps forward in preventive science in those years. The discoveries of the transmission of malaria and yellow fever through *Anopheles* and *Stegomyia* gave us the advantage, with which probably the French could have conquered as we did.

Tact and courtesy formed the keynote in producing results in sanitation. "It is surprising to an Anglo-Saxon, accustomed to our arbitrary police-court methods, to see how much can be accomplished with a Latin-American population by courtesy and kindness."

Yellow fever was stamped out in two years. The last case occurred in May, 1906, whereas in Habana the same result had been achieved in eight months. "The difference in the two instances in the length of time taken to accomplish the same results was due principally to difference in administrative methods. In Habana the chief sanitary officer was on the staff of the military governor, and reported directly to him. The military governor gave the chief sanitary officer every possible support as to power for carrying out the agreed-upon sanitary measures, and as to the necessary funds for this purpose, and never in any way interfered in the details of their execution. At Panama everything was just the opposite."

In combating malaria drainage occupied first place, oiling second, and larvacides third. Two hundred yards is a long flight for the *Anopheles*, and that was made the limit in mosquito work for the villages and isolated houses in the suburbs.

For mosquitoes found within screened places the best method was found to be the use of a test tube, in the bottom of which some material moistened with chloroform was placed. By gently enclosing the insect with the mouth of the tube he soon dropped stupified, enabling you not only to identify his species, but also to abstain from frightening his neighbors. "In this fashion we have kept 300 men in screened cars located in a swamp for two or three months at a time free from malaria. In the instance I have in mind, 200 soldiers, living in tents, had just left the same locality, having about 100 per cent of malaria. We used this method whenever, from any cause, mosquitoes were numerous."

Prophylactic dosage of quinin was used during the first five years at the option of the employees. When a locality was entirely cleared of mosquitoes this was discontinued. "Prophylactic quinin is a most useful measure, but should only be used pending the putting into effect the more permanent antimalarial measures. * * *

"In 1906 our malaria was at its height. We admitted to hospital in that year for this disease 821 out of every 1,000 of our employees. During the first eight months of 1913 we admitted to hospital at the rate of 47 per 1,000 per annum. During 1906 our death rate from disease among our negroes was at its highest, 45.38. For the first eight months of 1913, on an annual basis, that had fallen to 5.41 per 1,000. During 1906 our death rate from disease among our American whites was 10.96. During the first eight months of 1913 this rate had fallen to 2.48. During the first eight months of 1913 our death rate, on annual basis, from disease among our 4,500 American women and children was 4.27 per 1,000. These figures indicate what general sanitation had accomplished. * * *

"Our white men at Panama work out in the open, exposed to sun, rain, and wind, day in and day out, month after month, and year after year. What has been accomplished at Panama can be accomplished anywhere else in the Tropics. The expense is not large nor the labor great."—(R. C. R.)

TROPICAL MEDICINE.

E. R. STITT, Medical Director, United States Navy.

ROSS, R. **Malaria and the transmission of diseases.** The Huxley lecture. The Lancet. Nov. 7, 1914.

In this lecture attention is called to the fact that nature is as solicitous for parasites as for the higher animals which contain them. She thinks no more of man than of the minute germ which infests him.

Attention is directed to statistics which show that malaria is the most important disease of the Tropics, and possibly of the world in general. As a rule about one-third of the population of malarious countries suffer from malarial attacks every year, even 100 per cent of the children of certain very malarious regions may show either malarial parasites or splenic enlargement. While the case mortality is only about 0.5 per cent the prevalence of the disease is so great that the total mortality runs from 10 to 15 per 1,000, and in India it is estimated that malaria is responsible for about 1,300,000 deaths each year. Again, malaria so complicates other diseases in the Tropics that their treatment is rendered more difficult.

Sir Ronald notes that 10 years after the discovery of the cause of malaria by Laveran (1880) we were absolutely in the dark as to the method of transmission of the parasite. Much credit is given to Dr. A. F. A. King for the strong epidemiological evidence he advanced in favor of mosquito transmission of malaria, and his idea, that the mosquito inoculated the virus into man, is contrasted with that of Manson, who thought that the malarial flagellate body entered the tissues of the mosquito to undergo some developmental process and upon the death of the mosquito to enter the water and finally to rise in the marsh mist to infect man.

Neither Manson nor King attempted experimental verification of their views.

Ross states that when he took up his experimental work (1895) he had no knowledge of King's paper and was not aware of the work of Smith and Kilborne on the transmission of piroplasmosis by ticks.

He notes that for two years he caused mosquitoes of the genera *Culex* and *Stegomyia* to feed on the blood of malarial cases which showed crescents and that he compared dissections of such mosquitoes with others not so treated, the results being invariably negative.

In 1897, however, he obtained eight dappled-wing mosquitoes (*Anophelines*) and in two of them, dissected four and five days after feeding, he found bodies which he had not previously observed and which he felt were connected with the malarial problem. He states that he felt sure he had noted two facts, one the kind of mosquito in which the development occurred, and the other the location in the mosquito's alimentary tract of the developing malarial parasite.

At this time his experiments were interrupted for six months, and subsequently he was unable to work out the problem of transmission of malaria from mosquito to man. However, in 1898, he did this with a similar parasite of birds, proving that with this parasite of birds there was a developmental period in the intestine of the mosquito for one week, when there were formed numbers of elongated spores which latter worked their way to the salivary glands of the mosquito. Ross infected 22 out of 28 healthy birds by the bites of infected mosquitoes (*Culex*).

The author notes that his work was again interrupted and that he did not prove the mosquito transmission for man until 1899, which was subsequent to the successful experiments of the Italian investigators in 1898.

In concluding the author notes that although 15 years have elapsed since the knowledge of the mode of transmission of malaria was obtained, yet not more than one-tenth of the improvement of health has been effected which was possible of accomplishment had mankind put its heart into the problem of malaria eradication.—
(E. R. S.)

HEHIR, P. Prevention of malaria in the troops of our Indian empire. Indian Med. Gaz., Aug., 1914.

The author notes the necessity of examining children under ten years of age for splenic enlargement rather than the troops, these latter not giving a reliable indication of malarial infection owing to the effect of treatment in preventing enlargement of the spleen.

He considers that the malarial index is more practically obtained from a spleen index than by determining percentage of people showing parasites in the blood or the incidence of mosquitoes showing zygotes.

He notes that the children of the cantonments are the reservoirs of malaria, and gives figures where 3,884 children on the plains of India had enlarged spleen in 60 per cent of the number, and showed parasites in the blood in 40 per cent.

Col. Hehir insists that all soldiers infected with malaria should be treated at least four months. Relapses occur when previous infection has not been eradicated by proper quinin treatment. He deprecates the method of treating malarial cases for a week or so and then letting them fall into line with the men who are taking quinin prophylactically. Such a course discontinues the curative employment of quinin at the time the sexual forms tend to appear and makes such patients suitable subjects for the infection of mosquitoes.

Cases of malaria treated with small doses of quinin will, in all probability, relapse because the parasites of the nonsexual cycle in the spleen and bone marrow are but slightly affected thereby. He thinks we have no ground for believing that relapses are caused other than by latent asexual parasites taking on activity. He believes that were larger doses of quinin given during the first three weeks than are usually administered, with decreasing doses for the ensuing three months, there would be fewer relapses.

As regards diagnosis he believes that many fevers of uncertain origin can be proven malarial by withholding quinin temporarily and using a thick film method for searching for parasites. In his opinion quinin should not be given a doubtful case until malarial parasites or other blood changes indicating malaria are found, or when definite clinical manifestations point to the malarial nature of the fever.

He believes that failure of quinin prophylaxis can be explained by improper dosage, defective methods of administering the drug, postponing the administration too long, or using it in prophylactic doses when it should be given curatively. Prophylactic doses do little or no good when infection exists and probably create quinin resistant strains of malarial parasites. Many postpone the employment of quinin prophylaxis too long and only institute this measure when the incidence of malaria is rapidly rising.

Col. Hehir recommends for quinin prophylaxis 5 grains daily, provided the malaria is comparatively mild. If of severe type, he gives 10 grains every seventh day with 5 grains the other days of the week, and in very severe malaria he adds to his 5-grain daily dose 15 grains every seventh day.—(E. R. S.)

BAHR, P. H. *Researches in sprue.* Jour. Trop. Med., July 1, 1914.

The author notes that many consider a previous dysentery as an important predisposing factor, and that among the cases studied by him the occurrence of previous dysenteric attacks was noticeable. He is, however, inclined to regard such a factor as merely incidental.

In one-half of his cases the disease arose *de novo*, and he regards it as a primary, specific infection, in which, as in tuberculosis, the specific sprue germ is favored by lowering of the vital resistance. He has noted an increase of infection in those closely associated, and reports the case of a boy, aged 13, who contracted sprue as the result of being fed, with her own spoon, by his mother who was seriously ill with the disease.

Attention is directed to the failure of all experiments to transmit sprue to such lower animals as monkeys or rabbits, whether by inoculating material from sprue tongues or sprue stools.

Under the designation typical or complete sprue he includes cases showing the characteristic mouth and stools, but many cases are of incomplete sprue, when there is present the sprue diarrhea but without mouth symptoms. Other incomplete sprue cases show the disease confined to the buccal cavity, and he designates them "tongue sprue."

Bahr studied cases where the mouth symptoms had existed three years before the onset of the intestinal ones. He has seen diarrheas in Europeans, accompanied by emaciation, flatulence, and dyspepsia, which he regarded as early cases of sprue.

In tongue sprue there is an atrophy of the papillæ with a superficial fissuring.

In investigating the stools he noted that the fat absorption in his cases was only from 70 per cent to 90 per cent, while in normal milk-fed subjects it was 95 per cent. There was a complete absence of pancreatic ferments, and this, along with the bulky mass, high proportion of undigested fats and carbohydrates and acid reaction, indicated pancreatic inefficiency. A grave anemia was found only in most advanced cases.

As regards etiology he is inclined to believe that the ordinary thrush fungus, *Monilia albicans*, is the cause of the disease.—(E. R. S.)

PATHOLOGY, BACTERIOLOGY, AND ANIMAL PARASITOLOGY.

A. B. CLIFFORD, Passed Assistant Surgeon, and G. F. CLARK, Passed Assistant Surgeon,
United States Navy.

PAGE, B. W. Is pellagra due to an intestinal parasite? *Am. Jour. Pub. Health*,
Vol. IV, No. 10, Oct., 1914.

Page found the parasite in 17 pellagrins, in 2 cases associated with amebas and in 4 others with hookworm ova.

"The parasite appears in three different forms. First, an oval form resembling an ameba, but only about one-fiftieth to one-eighth the size of the latter. This trembling coccus slowly changes its position on the slide. It often changes its shape into the second form, that of a bacillus, which is capable of darting across the field and disappearing from view. Either of these forms may change into the third form, that of a spirillum, which is very active, but makes little progress across the field. In advanced cases of pellagra that have had little treatment the parasite changes its form very often.

"The technique for examination is the same as that for hookworm or ameba except that the oil immersion, one-twelfth, is used instead of the lower powers. The parasite may be found in feces several days old. * * *

"The most successful treatment that I have tried in the incipient stage is flowers of sulphur, 10 grains three times a day for several days. In the advanced stage, atoxyl and other preparations of arsenic render the parasite less active within a few hours. Emetin seems to have no effect on the parasite."

The author recommends the same sanitary prophylaxis as for typhoid fever and amebic dysentery.—(C. N. FISKE.)

FRANCIS, E. **Laboratory studies on tetanus.** *Hygienic Laboratory—Bulletin*
No. 95. August, 1914.

Francis discusses this important subject under three heads:

1. Conditions surrounding tetanus spores artificially implanted into vaccine virus.
2. The behavior of tetanus spores injected subcutaneously into guinea pigs and white mice.
3. Miscellaneous observations upon tetanus.

The Public Health Service tests vaccine virus for the presence of tetanus by four methods:

- (a) By planting into fermentation tubes of glucose bouillon and immediately incubating.
- (b) By planting into fermentation tubes of glucose bouillon and heating at 80° C. for an hour before incubating.
- (c) By planting into fermentation tubes of ordinary bouillon.
- (d) By inoculating it subcutaneously into guinea pigs.

No one of these methods is suitable for all samples of vaccine on account of the varied flora of the virus.

After incubating 24 hours those tubes showing an acidity of plus four to five or more usually inhibited development of the tetanus spores artificially implanted into vaccine virus. The acidity was brought about by staphylococci, *B. coli*, or *B. welchii*—frequently contaminating virus.

Because of the lessened production of acid, ordinary bouillon was found superior to glucose bouillon for isolating tetanus from the virus.

In some animals injected with tetanus spores and not developing tetanus it was found possible to bring about tetanus by injecting staphylococci or solutions of quinin. The staphylococci brought about the lighting up of tetanus in some instances after four months from the date of injecting the tetanus spores.

Cases of tetanus reported as following vaccination were visited and on investigation the original package containing the virus could usually be found or from the labels data could be obtained so that virus from the same lot could be examined. All such material proved negative for tetanus.—(G. F. C.)

MILLER, A. H. The cultivation of the tubercle bacillus. The Lancet, Sept. 19, 1914.

The author notes that by growing tubercle bacilli on glycerin egg medium, with from 1¼ to 3¼ per cent of sperm oil, the bacilli become unusually long, with tapering ends. The body of a bacillus loses its power of retaining the carbol fuchsin stain when treated by acid alcohol, but there are certain granules distributed irregularly which are acid fast.

The photomicrographs and drawings illustrating the article would suggest an unusually even distribution of the organisms. If such be the case, this method of growth may be of value when a suspension of uniform distribution is required.—(G. F. C.)

BROWN, C. P. The bacteriology of pyorrhea alveolaris. New York Med. Jour., Dec. 20, 1913.

The author reviews the literature of the subject and quotes the findings of numerous workers.

The following technique was used. After thorough cleansing of the gingival margin, a thin, spear-shaped instrument was heated to redness and while still hot was run up alongside of the root into the pocket. This was then streaked on the surface of slanted blood agar in test tubes. The cultures were then taken to the laboratory and

as much material as possible removed from them and spread over the surface of blood agar plates. After 24 hours incubation, colonies were transferred to blood agar slants, stained, examined for motility, etc.

In 41 cases there were found some 16 different organisms. Those occurring most frequently were streptococci, pneumococci, gram negative cocci, gram negative bacilli, and diphtheroid bacilli.

Autogenous vaccines were made using, where possible, all the organisms found in a case. It is stated that results were excellent.—(G. F. C.)

LEDINGHAM, J. C. G. Experimental production of purpura in animals. *The Lancet*, June 13, 1914.

The author calls attention to the work that has been done, showing the relation between blood platelets and the coagulation of the blood, and therefore the conditions grouped as hemorrhagic diathesis.

He prepared an antiplate serum by injecting guinea pig plates into rabbits. Some of the antiplate serum injected intraperitoneally or subcutaneously into guinea pigs gave rise to death, with extensive hemorrhages.

In vitro, there was marked coagulation of guinea pig red cells.

The author feels that his work tends to confirm the belief of the action of blood plates in coagulation of blood.—(G. F. C.)

CHEMISTRY AND PHARMACY.

E. W. BROWN, Passed Assistant Surgeon, and O. G. RUGE, Chief Pharmacist, United States Navy.

THOMPSON, W. On the influence of atmosphere, temperature, and humidity on animal metabolism. *Mem. and Proc. Manchester Lit. and Phil. Soc.* 57 (1912-13), pt. 3, No. 13, p. 8.

From the observation that the percentages of carbon dioxide in the air exhaled from the lungs of a number of people were on certain days nearly all low, while on other days they were nearly all relatively high, the author was led to conduct a series of experiments in which the carbon dioxide in the air exhaled from the lungs was determined and at the same time observations made by the barometer, hygrometer, and thermometer.

It was shown by experiments that the percentage of carbon dioxide in the exhaled air was greater when the inhaled air had been previously dried with strong sulphuric acid, from which the author assumed that metabolism would be greater when breathing dry air than when breathing damp air. It was observed that the percentage of carbon dioxide in the exhaled air was greater at high elevations

than in the valleys and also greater in valleys than in a deep coal mine, from which the assumption is made that a low barometric pressure would produce increased metabolism, while high barometric pressure would result in decreased metabolism.

Greater metabolism, as indicated by production of carbon dioxid, was observed when the body was surrounded by cold air than when it was surrounded by warm or hot air, but if the body remained in cold air and warm or hot air was breathed metabolism was greatly increased. It was also noticed that the breathing of pure dry oxygen produced no greater metabolism than that of ordinary dry air. It was found that the metabolism was greatly increased for some time after violent exercise had been taken.

The data of these experiments with human beings and similar ones with laboratory animals are presented in tabular form, from which it appears "that, on all occasions where the barometer, hygrometer, or thermometer alters appreciably, there is a corresponding change in the percentage of carbon dioxid in the exhaled air of all, or nearly all, the persons or animals tested." A rise in the barometer or marked increase in humidity produced a fall in the carbon dioxid, while a fall in the barometer or decrease in humidity produced a rise in the carbon dioxid exhaled. "The rise of temperature of the air produced a lowering of the carbon dioxid in the exhaled air, and a fall in the temperature produced a rise.

"The rate of the pulse seemed to have no influence on the percentage of carbon dioxid in the exhaled air. The temperature (sublingual) of the body appeared also to have little influence on the carbon dioxid in the expired air."—(E. W. B.)

THOMPSON, W. The influence of moisture in the air on metabolism in the body. Mem. and Proc. Manchester Lit. and Phil. Soc., 57 (1912-13), pt. 3, No. 14, p. 4.

Further experimental data regarding the effect of moisture in the air are reported by the author in confirmation of the observations of the experiments noted above.

In these experiments three different persons breathed first damp and then dry air at about 56° F., and afterwards both damp and dry air at 98°. An average increase of 4 per cent in the carbon dioxid in the exhaled air was observed when dry cold air was breathed over that observed when damp air was breathed. When warm dry air was breathed an increase of about 7.5 per cent was observed over that observed when damp warm air was breathed.—(E. W. B.)

WISEMAN, C. **Biochemical studies of expired air in relation to ventilation.**
Easton, Pa., 1913, p. 99.

An extended summary of data regarding the subject is given, and the results are reported in a series of experiments, from which the following conclusions are drawn:

Subcutaneous injections into guinea pigs of either isotonic condensation liquid from human breath, in amounts up to 20 cubic centimeters, followed by intravenous injections of human blood serum in amounts up to 0.5 cubic centimeter, or of isotonic condensation liquid from human breath, followed by intravenous injections of the same kind of material in amounts up to 3 cubic centimeters, with a suitable incubation period between both injections, did not result in anaphylactic shock. Likewise intravenous injection of this liquid into human beings in amounts up to 8 cubic centimeters was not toxic. There was no evidence to show that the condensation liquid obtained from males is more toxic than that from females, or that proteins are volatile.

From the fact that the extremely sensitive anaphylactic test failed to show the presence of any sensitizing material in human breath, it is concluded that this material is not a factor to which may be attributed the ill effects of poor ventilation. The results of these experiments are contradictory to those obtained by Rosenau and Amoss previously noted.—(E. W. B.)

PALMER, W. W. **The absorption of protein and fat after resection of one-half of the small intestine.** *Am. Jour. Med. Sc.*, CXLVII, December, 1914.

The series of observations were made upon a woman from whom 235 centimeters of small intestine had been removed for tuberculous ulcers and strictures. The intestine was joined to the colon by a lateral anastomosis. Three weeks after operation, on a liquid and soft-solid diet, there were daily two or three large, liquid, foul-smelling stools, showing an excess of fatty acids and soaps; little neutral fat and no mucus, pus, or blood was seen.

Absorption experiments and studies of calcium metabolism were carried out.

"Total nitrogen, urea, and ammonia were determined according to Folin's new methods. For uric acid and creatinin the methods of Folin were used. Creatin was determined by Folin's method. The colorimetric method described by Myers and Fine was used to estimate indican. For the hydrogen ion concentration the method of Henderson and Palmer; titratable acid, Henderson's method; and calcium, McCrudden's method, were employed.

"Feces. In periods 1 and 2 large amounts of 95 per cent alcohol were added to the fresh feces, which were dried on the water bath to

a constant weight. After pulverization nitrogen was determined by the usual Kjeldahl method; fat and fatty acid according to the method of Folin and Wentworth. In period 3 the nitrogen determinations were made on the fresh stools, which were kept frozen until the end of the experiment. The fat estimations were made after drying, as described above. To estimate the calcium in the feces, the organic matter was destroyed by nitric and sulphuric acid after the method of Neumann and the determinations made as in the method of urine.

"Diet. In periods 1 and 3 the diet consisted of eggs, bread, sugar, butter, and milk, accurately weighed, and the nitrogen and fat computed from the tables of Atwater and Bryant, with the exception that the fat and nitrogen in the milk were determined by analysis.

"In period 2 the food was analyzed for nitrogen, fat, and calcium. The food mixture used was the one employed by Folin in his work on normal urines:

Whole milk	-----cubic centimeters	500
Cream (18 to 22 per cent fat)	-----do	300
Eggs (white and yolk)	-----grams	450
Horlick's malted milk	-----do	200
Sugar	-----do	20
Sodium chlorid	-----do	0

Water enough to make the whole up to 2 liters. In addition, soda crackers were allowed.

"It would seem doubtful if even under the most favorable circumstances more than half of the small intestine should be removed in human individuals. * * * In certain acute conditions, such as volvulus, intussusception, and incarcerated hernia, where there is beginning gangrene, the surgeon is left no choice and must take the chance.

"In men and animals alike fat absorption is most disturbed, nitrogen less interfered with, and carbohydrates are nearly always absorbed in a normal manner. The highest percentage, 34.2, of nitrogen loss in the feces is found in Axhausen's case, in which 473 centimeters of small intestine were resected. The nitrogen found normally in the feces, according to Schmidt and Strasburger, is 4 to 6 per cent. Zusch reports the highest percentage, 38, of fat lost in the feces. Schmidt and Strasburger give the average daily loss of fat in the stools of a normal individual taking a mixed diet at 4 to 6 per cent of the intake. According to these observers, and also Folin and Wentworth, 60 to 70 per cent of the fat recovered in the stools is in the form of fatty acid.

"Summary: (1) Absorption studies after resection of the lower half of the small intestine are reported. (2) The loss of nitrogen in the stools is 4 to 5 times that of normal individuals. (3) The loss in fat in the stools is 5 to 6 times the normal loss. (4) A high uri-

nary indican—800 milligrams—is reported. (5) Ammonia forms a much larger part of the urinary nitrogen than in normal individuals. This is probably due to the extensive putrefaction taking place in the intestine. (6) The success with which a large portion of the intestine may be removed depends to a large degree on the condition of the intestine remaining. This fact is important, and should be considered carefully before extensive resections are undertaken. (7) A diet low in fat and moderately low in protein should be given in cases where much intestine has been removed.”—(R. C. R.)

EYE, EAR, NOSE, AND THROAT.

E. J. GROW, Surgeon, and G. B. TRIBLE, Passed Assistant Surgeon, United States Navy.

FOX and BATROFF. **Relation of arterial hypertension to subconjunctival hemorrhage.** *Colorado Medicine.*

“An analysis of 100 cases shows 17 cases of conjunctival hemorrhage with an average blood pressure of 110 millimeters.

“It is not unusual to find subconjunctival hemorrhage in cases of normal and subnormal arterial pressure, but the presence of this form of hemorrhage without apparent cause should direct attention to the blood pressure and conditions which are apt to bring about its increase.”—(E. J. G.)

VEASY, C. A. **Ocular manifestations of arteriosclerosis and their diagnostic and prognostic significance.** *Jour. Ophth. and Oto-Laryngol.*, May, 1911.

“When the changes may be detected in the larger vessels, as the radials, the disease has then advanced beyond the stage in which the most good toward controlling it could have been accomplished.

“The retinal arteries being small, terminals brought into actual view by means of the ophthalmoscope afford us an opportunity for observation and study that does not exist in any other organ of the body.

“We are therefore enabled to detect the most minute changes long before they can be detected by touch or other means elsewhere, and according to Osler, Stengel, and many others the very earliest signs of arteriosclerosis can be detected by aid of the ophthalmoscope.

“According to the late Dr. Gunn, it is most apt to make its appearance between 40 and 50 years of age, though often seen at a much earlier age.

“It is evident, therefore, that the plain duty of the general physician is to advise a thorough examination of the eyes in suspected cases of arteriosclerosis. If this is done treatment may be instituted earlier than formerly and the usefulness of the patient preserved many more years than has heretofore been expected.”—(E. J. G.)

SCHAUZ, F. **Salvarsan treatment and optic neuritis.** München. med. Wehnschr. No. 10.

The author reports two cases of specific optic neuritis following treatment by injection with salvarsan. In both cases the condition of the nerve was cured by repetition of the injection of salvarsan. The optic neuritis could not have been caused by the first injection; it was a case of recurrence of syphilitic manifestation, due to lack of complete cure from the first injection of salvarsan.—(E. J. G.)

FUCHS, E. **Eye in locomotor ataxia.** Wien. klin. Wehnschr., Apr. 4, 1912.

The following are important diagnostic features between syphilis and locomotor ataxia:

1. Frequent changes of ocular symptoms speak for syphilis.
 2. Myosis and reflectory pupillary rigidity are found more frequently in tabes, whereas total rigidity of the pupil or dilatation of the pupil with paralysis of accommodation is more frequent in syphilis.
 3. Simple atrophy of the optic nerve is frequently found in locomotor ataxia; the nerve becomes pale at the beginning of the disease, whereas in syphilis paleness begins after visual disturbances have been in existence for some time.
 4. A good response to antisyphilitic treatment speaks for syphilis and against tabes.—(E. J. G.)
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JACKSON, C. **The direct method of the intralaryngeal operation.** Jour. Am. Med. Assn., LXII, No. 22.

Anesthesia in the case of adults is produced by the application of 6 per cent cocain solution, supplemented by a 20 per cent solution applied to the interior of the larynx. In certain cases the ischemia produced by cocain renders its use objectionable and a general anesthetic must be employed.

In children it is preferable to use no anesthetic.

This method is the only one by which the larynx of children can be operated upon.—(G. B. T.)

HOLMES, C. R. **Inflammation of the accessory sinuses.** Lancet-Clinic, Oct. 31, 1914.

The cavities affected are, according to him, the antrum, anterior and posterior ethmoidal, sphenoidal, and frontal. The most frequent causes are influenza and the ordinary catarrhal colds. Lack of recuperative power, repeated colds, or anatomical peculiarities are

conditions which cause chronic inflammations to follow influenza, colds, or exanthemata. In making a diagnosis the point of exit of the pus, the results of transillumination, and X-ray findings are important.—(G. B. T.)

THEISEN, C. M., and FROMM, N. K. **Normal horse serum in hemorrhage from nose and throat operations.** New York Med. Jour., Vol. C, No. 18.

In these cases the serum injections were given irrespective of the coagulation time before operating. They were given in cases in which severe hemorrhage was expected from an unfavorable family history or previous severe hemorrhages in the patient.

The coagulation time was estimated by the coagulometer of Russell and Brodie, as modified by Boggs.

Only eight cases of the series are reported in detail; in these the average coagulation time before injection was 5.18 minutes, after injection 4.12 minutes.

General anesthesia was used in all except two cases. No case of anaphylaxis was observed.—(G. B. T.)

HUNTINGTON, W. H. **Tonsillectomy, its indications and choice of operation.** Med Rec., New York, LXXXVI, No. 7.

Tonsils should be removed when found in chronic state of inflammation and with a history of repeated attacks of tonsillitis or quinsy. The operation should never be done sooner than a week or 10 days following the subsidence of an acute attack. The relation of the tonsils and articular rheumatism, endocarditis, and chorea are emphasized. The local diseases attributable to the tonsil and adenoids are rhinitis, adenitis, and secondary conditions due to extension, such as disturbances of the middle ear, tubal catarrh, enlarged cervical glands, etc.

The method of operation most in favor with the author is the combined finger and instrumental for removal of the tonsil, and the La Force adenotome for adenoids.—(G. B. T.)

CARTER, W. W. **The correction of nasal deformities by mechanical replacement and the transplantation of bone.** New York State Jour. Med. XIV, No. 11.

The nasal arch may be considered as an arch built up as an indefinite number of segments, assembled on a curved line in such a way as to retain their position when the structure is supported extraneously only at its two extremities. The septum strengthens the nasal arch, but does not support it; its entire removal does not endanger the arch, unless the upper edge, which acts as a keystone, has been disturbed.

The bridge splint, as described by the author, consists of two fenestrated curved steel wings, hinged together in the middle. The edges are padded with rubber and the distance to which they can be separated is regulated by a thumbscrew. The intranasal splints, used in connection with the bridge, are made of sheet gutta-percha and are molded to the patient's nose at the time of operation. These are attached to heavy silk sutures, threaded into large curved needles.

To prepare a case for application of splints it is necessary to mobilize the framework by specially designed chisel and forceps. The sutures attached to the intranasal splint are introduced from within the nose through the cartilaginous dorsum just below the ends of the nasal bones. The sutures are drawn up so that the splints are pulled up against the roof of the nose, the upper ends lying under the nasal bones, the lower ends in the vestibules. The external splint or bridge is now applied, the wings padded with gauze. The sutures attached to the intranasal splints are introduced through the fenestra, the dorsum of the nose lifted, and the sutures tied over the bridge. By means of the screw the side walls can be moved together, narrowing the nasal arch. Care to prevent undue pressure must be observed. Bony union occurs in about three weeks, the gaps caused by raising the bridge are filled in by bone in about six weeks.

Transplantation of the bone: Deformities due to a deficiency in the bony framework are unsuitable for the bridge splint. These depressed deformities are suitable for bone transplantation.

Asepsis and antisepsis must be rigorously carried out, but strong antiseptics are unsuitable at the time of operation because they lower the cellular activity of the bone and tissue.

In general, two types of incisions are used: (1) A curved incision made between the eyebrows; (2) an intranasal incision made at a point corresponding to the lower edge of the upper lateral cartilage. The first incision is preferable if possible.

After preparation of the field about 2 inches of the ninth rib on the right side are removed by the costotome, preserving the periosteum in the anterior surface. The piece of rib is split in its transverse diameter and the cancellous tissue scraped from the periosteum-covered compact bone.

The transplant is placed in position in the nose, the lower end reaching nearly to the tip, the upper end anchored under the periosteum just below the glabella. Various modifications are suggested by the author, but the basic principles are noted above. The autoplasmic operation is preferable.

Results of cases after several years are reported as very good.—
(G. B. T.)

REPORTS.

POINTS OF INTEREST ABOUT THE MEXICAN CONSTITUTIONALIST WOUNDED AT MAZATLAN.

By P. S. ROSSITER, Surgeon, United States Navy.

The city of Mazatlan, in the State of Sinaloa, Mexico, is one of the oldest and most important cities on the west coast of Mexico. It is just within the Tropics, and the surrounding country is well watered and fertile, the red and yellow barren hills of Sonora having been replaced by the tropical verdure of southern Mexico.

The city is located on a peninsula with the sea on one side and a shallow bay and *estero* on the other, and is connected with the mainland by an isthmus three-fourths of a mile wide, on which are situated three hills 90 to 150 feet high, constituting *El Atravesado* (The Crossing).

Mazatlan has been closely invested by the Constitutionalist forces since August, 1913, so that when it finally fell, on the night of August 9, 1914, it had sustained a siege of one year.

During this year the number of Federal troops in the garrison varied from about 1,500 at the time of the first investment to about 3,500 at the time of evacuation.

The number of the Constitutionalist besiegers was about 2,500 at the time of investment, reached 10,000 during April and May, 1914, and, on account of the dispatch of troops to assist in the campaign about Mexico City, fell to about 3,000 at the date of evacuation.

The civil population of the city is normally 22,000, but from many families moving away to escape the dangers and discomforts of the siege, deaths, and enlistments in the Constitutionalist army it had fallen to about 12,000.

Early in the investment the water supply of the city was cut, and for nearly a year both the civil and military population had to depend on the water stored in cisterns or from wells in the city, and later a few wells dug near the beach. Early in June, 1914, the water supply was almost exhausted and the garrison on the point of surrender, when the onset of the rainy season relieved their most pressing needs in this respect.

As the Federals had control of the sea through three small gunboats, the port was kept open and the food supply of the city ample until the last of April, 1914, when the crew of one gunboat, the

Tampico, mutinied and took her into the Constitutionalist port of Topolobampo, and another, the *Morelos*, grounded in Mazatlan Bay directly under fire of the Constitutionalist batteries, which forced her abandonment after 48 hours, when the Constitutionlists boarded her, wrecked her with dynamite, and burned her. This left only one, the *Guerrero*, to keep open the communications of Guaymas and Mazatlan, both of which were closely invested. The Constitutionalist lines began to draw about the city of Mazatlan, firing on all ships bringing supplies, and the city for the first time felt the lack of food. From this, of course, the military suffered least, seizing provisions wherever they could be obtained. The price of foodstuffs rose appallingly, and finally flour, corn, and meat were practically unobtainable. Hundreds of women besieged the house of the military governor and the real pangs of the siege began to be felt.

Toward the last, when the Constitutionalist lines were daily tightening and when it was evident that the fall of the city was near, the Constitutionalist leaders permitted several shipments of cattle and corn to enter the city for free distribution to the poor, as fully 90 per cent of the civil population were Constitutionalist sympathizers.

Sickness in the city was not as extensive as might have been expected. There was, so far as known, no typhus, which is common in Mexico, and very few cases of smallpox, but toward the end of July the death rate from disease reached 25 to 30 per day, principally from dysentery, with a high death rate among children from lack of proper food.

Early in July the Federal commander, Gen. Rodriguez, decided to evacuate the city, and transports under the convoy of the *Guerrero* were assembled for the purpose. An attempt was made to evacuate peacefully, and on July 12 representatives from both forces met on board the U. S. S. *California*, but a deadlock was reached, the Constitutionlists demanding that the Federals should surrender their arms before being allowed to depart unhindered. After 72 hours' armistice fighting was resumed, which continued in a desultory manner until August 1, when the Constitutionlists' attacks, becoming too heavy, the Federals began embarking. On July 31, 1914, 700 Chinese refugees from Mazatlan were removed by the boats of the American men-of-war to an island where they were supplied with water by the *Albany*. One hundred and twenty other foreign subjects—men, women, and children—were taken aboard the *California*, the British gunboat *Algerine*, and the German cruiser *Leipzig*. Upon the threatened outbreak of hostilities between Great Britain and Germany these were all transferred to the *California*, and the *Algerine* and *Leipzig* put to sea.

Unfortunately the Federals had declined all offers of medical assistance from us and had discouraged all efforts to visit their hos-

pitals to see the wounded. These wounds would have been of interest, as fully 70 per cent of the Constitutionalist ammunition was of the soft-nose, or dum-dum, variety.

On August 7 the fleet surgeon and the surgeon of the *California* visited the Constitutionalist lines to the north of Mazatlan and saw the wounded in a field hospital at Loma Verdugo and the base hospital at Otatis. The field hospital was located in a ranch house about 1 mile from the firing line, and at the time of our visit, which was very brief, contained 26 wounded from the previous 24 hours' fighting. The wounds were all as neatly dressed as a scanty supply of dressings would permit and the patients made quite comfortable on clean mats on the wide porches. The cleanliness and order of this hospital seemed largely due to the intelligence and efforts of two young girls, who had been driven from Mazatlan on account of their Constitutionalist sympathies and had volunteered as nurses.

Otatis was found at the end of a railroad spur which had been run in to carry supplies and troops. Here the wounded were all quartered in cars—mostly refrigerator cars. The 90 wounded were not nearly so well cared for as those at the field hospital at Loma Verdugo. These cases were older, most of the wounds were infected and filled with maggots; what surgical assistance they had received was crude and the efforts badly directed. Upon our return to the *California* we sent ashore a supply of dressings for all these cases.

The Federal first line of defense had fallen into the hands of the Constitutionlists on August 6 after hard fighting, as this line was located on the three hills of El Atravesado and strongly protected by barbed-wire entanglements and mines. On the night of August 9 the Federals attempted to withdraw from their second line and embark their rear guard. This precipitated the final assault, which culminated in street fighting and the gunboat *Guerrero* firing shell into the streets of the city in an effort to save the rear guard, which had been cut off, 350 of whom were eventually captured. All captured Federal officers were executed the following morning. The enlisted men were allowed to "volunteer" as Constitutionlists.

On the morning of August 10 the commander in chief offered to the Constitutionalist commander the services of the American medical officers in caring for the wounded. This offer was gladly accepted, and from that date until August 15 American medical officers and hospital corpsmen were ashore on this duty, the wounded in the largest hospital being wholly under their care.

Immediately upon gaining control of the city the Constitutionlists commenced providing for the care of the wounded, who began coming in by rail, in carriages, and on foot early in the morning. The Casino, a large club located on the second floor of a building facing the Plaza Machado, was occupied as a hospital, and cots,

pajamas, bedding, and utensils requisitioned from the stores, the largest pharmacy in the city being taken over in toto. Here the American detachment took charge of the wounded for five days.

The Constitutionlists were woefully lacking in the number of their medical officers and hospital attendants, as many of the doctors of Mazatlan had left with the Federal forces; but the chief surgeon, Dr. Urrea, worked heroically organizing a volunteer nurse corps, and with what forces he could get together he opened a second hospital in another clubhouse on August 12. All medical and infectious cases were sent to the local civil hospital. The old military hospital was used for venereal cases.

All surgical supplies used in the Casino hospital for the first four days were furnished by the *California*.

On both sides the statistics were so unreliable that the exact number of killed and wounded will never be known, but the Federals are said to have embarked 350 wounded and to have had about 400 killed. The latter estimate is probably too high. Of those wounded it is reported that only about 60 reached their destination at Salina Cruz, and these in a horrible state from lack of care and dressing and the crowded and filthy condition of the transports.

Our estimate is that in the last 10 days' fighting the Constitutionlists lost 150 killed and 300 wounded.

The wounds seen by us in Mazatlan were classified as follows:

Abdominal, perforating.....	5	Larynx (tracheotomy performed).....	1
Abdominal, nonperforating.....	1	Neck.....	1
Lung.....	11	Face.....	1
Thorax, nonperforating.....	4	Amputation, arm, by explosion....	1
Pelvis, perforating.....	4	Upper limbs.....	40
Pelvis, penetrating.....	1	Lower limbs.....	85
Brain.....	3		
Cranium, nonperforating.....	1	Total.....	159

Of interest in connection with these cases is the following: All bullet wounds were by .30-caliber sharp-pointed, steel-jacketed projectiles, the Federal troops being armed with the Mauser rifle and the 80 mm. Schneider-Canet fieldpiece.

ABDOMINAL PERFORATING WOUNDS.—When seen, one case was 2 days old, two 72 hours old, and one 24 hours old. None of the patients had undergone operation. All had undoubtedly received perforations of the intestinal tract. They had been subjected to the crudest methods of transportation.

Case 50.—Seventy-two hours old; the wound of entrance was 4 cm. above and 3 cm. internal to McBurney's point; exit was between the spine and crest of ilium on the right side; there were symptoms of general peritonitis when received. He was placed in the Fowler position; the rather large wound of entrance was enlarged and a

drain inserted; rectal feeding. Two days later the belly wall was flat and he was in excellent shape.

Case 34.—Five days old; one wound was through the left lung, one through right lung, one through abdomen 10 cm. below the left subcostal border, and one through the abdomen midway between the umbilicus and McBurney's point. These wounds were apparently from a machine gun, and all passed directly through the body from front to back. The man was in excellent shape, wounds healed, no pain or tympanites, no coughing of blood for 90 hours. His temperature was normal and he was with difficulty persuaded to remain in the hospital.

Case 35.—Five days old; entrance was in middle of left subcostal region, with exit in right iliac. No tympanites; wounds healed; doing well.

Case 70.—Seventy-two hours old; entrance 5 cm. to right of anterior iliac spine; exit just to right of third lumbar vertebra; no peritonitis; doing well with Fowler position and rectal feeding. On the third day of admission, fifth of wound, he got out of bed and ate a heavy meal, developed general peritonitis, and died within 24 hours. This was the only case of perforating wound of abdomen reaching the hospital which did not recover.

WOUNDS OF BRAIN—*Case 1.*—Forty-eight hours old; entrance 10 cm. above middle of right orbit; exit just above larynx in median line; wound of exit was infected, with loss of vision of right eye. When last seen doing well.

Case 67.—Twenty-six hours old; entrance left parietal region 5 cm. from median line and 5 cm. posterior to external angular process; exit upper right eyelid; clean-cut holes with no spicules. Had loss of speech; temperature 109° F. Abscess of brain was drained. Died on fifth day.

Case 57.—Twenty-four hours old; clean-cut wounds; that of entrance above left external ear, that of exit directly opposite. Doing well; temperature normal; no loss of function observable. Wound clean.

WOUNDS OF NECK—*Case 72.*—Sixty hours old; ball passed through the nape of the neck, grazing the spinous process of the sixth cervical vertebra. There had been some stunning and the wound was badly infected.

WOUNDS OF PELVIS, PERFORATING—*Case 61.*—Six months old; entrance just above pubes 3 cm. to the left of median line; exit at tuberosity of right ischium; history of slight trouble at urination shortly after injury; has been on duty and in action for the past five months; no history of blood in urine; purulent discharge from both wounds.

WOUNDS OF PELVIS, PENETRATING—*Case 66*.—Forty-eight hours old; entrance 3 cm. to left of second lumbar vertebra; projectile at rest in vicinity of left ischium; slight pain; wound not infected.

WOUNDS OF FACE—*Case 68*.—Twenty-four hours old; entrance on right side of face, carrying away second upper and lower molars; exit through left ramus of inferior maxilla; no fracture; tongue slightly lacerated.

WOUNDS OF UPPER LIMBS (40).—These were nearly all cleanly drilled wounds, giving little trouble. The only fractures were three of the humerus, one by shrapnel and two by bullet, and three of the metacarpals.

One arm was amputated in the lower third on account of a badly shattered humerus with laceration of vessels. One forearm was amputated in the lower third; this case was in a child 5 years old. Three children were playing with a bomb when the latter exploded; two sustained multiple superficial lacerations all over their bodies, the third had his right hand blown off at the wrist.

WOUNDS OF LOWER LIMBS (85).—These include one fracture of femur, one of tibia, one of tibia and fibula. Twenty-eight, or 33 per cent, of these wounds were in the feet. Only 20 per cent of wounds of the feet were infected.

Case 2.—Seen on fifth day; had been shot through the ankle and dressed once; there was cellulitis halfway to the knee; the wound was freely opened and drained and half a pint of pus evacuated. A large hot dressing was put on, but amputation was considered probable on the following day. During the night a native doctor saw the case, made a diagnosis of erysipelas, and sent him to the infectious hospital, where he probably died.

SHRAPNEL WOUNDS.—The only case of importance was No. 63, in which shrapnel burst so near the patient's left shoulder as to powder-burn his left arm and hand and left side of face. Nine shrapnel balls entered the shoulder and arm. The humerus was fractured in the middle. All balls passed through except one, which was extracted from above the spine of the scapula. After his third dressing he was in excellent shape.

One man received six wounds, two through the chest, two through the abdomen, and one through each thigh. On the fourth day he was in excellent condition and doubtless made a rapid recovery.

One man during a repulsed attack was shot through the left lower abdomen. He jumped into the water, and almost immediately had his left humerus broken by the fire from a machine gun. He remained in the water for an hour and a half and crawled into camp with feces oozing from the wounds. He recovered.

OBSERVATIONS OF INTEREST.—Without first-aid packets of any kind, 51 per cent of our wounds were infected. The scanty clothing may have had some effect in this.

The liberal use of tincture of iodine gave excellent results.

In dressing many cases where frequent cleansing of the hands was necessary, we relied on heavy rubber gloves, frequently changed and frequently immersed in bichlorid solution. All wounds and dressings were manipulated only with forceps where practicable.

Nearly all abdominal wounds did excellently without operation. The fact that food was very scarce on the firing line may have effected the result.

Practically all cases were transportable.

Fractures of the femur were the most difficult to transport.

The large proportion of wounds of the lower extremities and of these the large percentage of wounds of the feet may be accounted for by a plunging fire, and also by the fact that the attackers took advantage of slight inequalities of the ground, sheltering their heads and trunks but leaving their legs exposed to a plunging fire.

No cases of erysipelas or gangrene were seen.

Where it is impossible to screen field hospitals, the liberal use of lysol sprinkled about will drive away flies.

The fact that most of these wounds were cleanly drilled was due to the fact that most were received at midranges, 600 to 1,500 yards.

The Mexican peon, who is about 95 per cent of Indian blood, bears pain and hardships with little complaint.

SANITARY REPORT OF MARINE BRIGADE.

By D. N. CARPENTER, Surgeon, United States Navy.

At daylight, the morning of April 22, the *Hancock* arrived at Vera Cruz and the troops were landed at noon. The battalion from the *Prairie* had been on shore since the morning of April 21. The marines from the fleet and Maj. Butler's battalion had landed early the morning of April 22. The battalion from Pensacola arrived on the *Mississippi*, with the aviation detachment, and all these marines joined the brigade. Special reports of the work of the brigade during the occupation of Vera Cruz have been submitted.

The Marine Regiment from the fleet embarked with the Navy when the United States Army occupied the city, May 1. A third regiment of marines from the United States arrived April 30, and an Artillery company from Guantanamo increased the strength of the brigade to 3,200. During the last four months the marine brigade gradually decreased in strength owing to transfers, discharge

by expiration of enlistment, invalidism, etc., until at the time of evacuation of the city, November 23, there were approximately 2,600 men. These troops were embarked on the transports *Denver*, *City of Memphis*, and *San Marcos* for passage to Philadelphia, Pa., where they arrived December 4, 1914.

The sick and wounded of the brigade, after landing at Vera Cruz, were at first sent to the *Solace*, until her departure compelled the opening of the field hospital, May 4. When this hospital was closed, September 24, the remaining sick were sent to the *Solace*, and until October 30 the hospital ship was used for the seriously sick in the brigade. After her departure it was not considered advisable to reopen the field hospital. The first regiment infirmary was prepared for operative cases and patients needing hospital care, while the majority of the sick were treated at the organization infirmaries.

Upon the arrival of the Army, the marine brigade was ordered to do duty with them. As the Medical Department of the Navy serves with the marines and differs in its records and returns from the Medical Department of the Army, the same organization established at Culebra continued in existence. The chief surgeon directed the work of the marine medical department through the brigade surgeon. The sanitary inspections were made daily by each surgeon, weekly by the brigade surgeon of every organization, and from time to time by the sanitary inspector of the expeditionary forces. A combined daily report of sick, a weekly statistical report, and a monthly sanitary report were made to the chief surgeon by the brigade surgeon. In accordance with the Army Regulations, venereal inspections were made bimonthly.

The first epidemic disease of importance was bacillary dysentery. Owing to the length of time necessary to obtain material to construct screened kitchens and mess halls, this disease prevailed for about two months. That it was fly borne was thoroughly believed by every medical officer, and after proper protection the epidemic ceased. For this reason a recommendation has been made to the brigade commander to provide portable frames for screened "company kitchens and mess hall combined" on future expeditions. There were very few cases of amebic dysentery and this disease is no longer feared, now that we have emetin. There were no cases of typhoid in the brigade, owing to the thorough vaccination of the men, another proof of its efficiency.

Quinin, grains 3, was ordered by the chief surgeon to be given daily to every man as a prophylactic against malaria. During June the number of cases increased, reaching a maximum in July and August. The daily dose of quinin was increased from 3 to 6 and then to 9 grains in the organizations showing the greatest infection.

Venereal disease proved to be the greatest factor in disabling the men of the brigade, in spite of the order causing loss of pay while on the sick list, in spite of venereal prophylaxis upon return from liberty, in spite of inspection and segregation of diseased prostitutes, the equipment of prophylaxis in the houses, and the use of glycerin lubricant, and in spite of compulsory venereal inspections with the possibility of punishment for failure to take prophylaxis. All these means failed to cut down the average of 25 to 40 per cent of the total sick due to venereal disease. Chancroid was the common infection, and the percentage of complicating bubo was high.

Considering the tropical conditions and the hard duty the marines performed, holding the principal outposts with accompanying exposure, the total sick rate was small, averaging from 1 to 2 per cent. There were seven deaths in all; of these, four were due to disease, but only one can be directly attributed to epidemic influences at Vera Cruz. Excluding the deaths from violence, the death rate from disease was 2.5 per 1,000.

The equipment of the medical department of the brigade at Vera Cruz consisted of the new outfit that had been kept for this emergency. As soon as the Army medical reserve supplies were ready for issue the field outfits were refilled and held intact in case of a forward movement. Accessory post stores were obtained from the *Solace* and the Army and were used by the field hospital and each organization. It was seen that this method will be necessary on future marine expeditions, and therefore that part of the report on equipment while at Culebra is modified. A few accessory stores, comprising expendable drugs, gauze, cotton, bandages, and adhesive plaster, cases of malted milk, soup, etc., should be included in the medical equipment of every expedition. One box should be supplied with an outfit for prophylaxis and treatment of venereal diseases. These stores will permit the field cases to be kept in reserve while at a semipermanent camp. At present the Army outfits are based on three months' supply for 1,500 men, but this may be cut down to an amount sufficient for three or four weeks, depending on the establishment of depots of reserve supplies. The deficiencies in the Army units for marine expeditions have already been referred to in the Culebra report. While at Vera Cruz a few additional changes in the new brigade outfit were indicated.

The medical cases for the company units were received and considered satisfactory with the exception that the container for the bichlorid tablets has little to differentiate it from the medicines. These tablets should be placed in the pouches originally suggested and the container filled with brown mixture tablets. There is sufficient space for more tubes of ointment and a clinical thermometer. A small vial of oil of cloves would be useful for toothache. The

pouches should have straps at the corners of the flap as well as at the center. The acetylene lamps are of doubtful value.

Makeshift boxes for health records indicated the need of proper cases. As the company is often separated from the regiment, a case sufficiently large to hold the health records of the largest company was recommended. One was manufactured at the quartermaster's depot, Philadelphia, and sent for trial. It proved to be satisfactory. The probability of going into the field at Vera Cruz led to the recommendation that loose sheets of health records be carried by medical officers, to be sure that sickness and casualties were recorded. Identification tags were recommended. The stamping outfit was received, but the tags themselves were not delivered. The loss and injury of first-aid packets demanded a method of protection. At least 800 packets were rendered useless the first few weeks at Vera Cruz owing to the pulling out of the hooks. Canvas pouches similar to those in use by the Army were recommended and finally received.

During this expedition, the Darnall filter was used and proved to be satisfactory. It is lighter and easier to handle than the Forbes-Waterhouse. The ideal filter for troops on the march is yet to be found, but the canvas-bag filter suggested by Maj. Lyster promises to be the best solution of this problem. At present there are but two emergency cases to each regimental outfit. These are so useful that there should be one for each medical officer, hence an additional emergency case is recommended. When the regimental outfit is sent alone it should include an eye and ear case and a genito-urinary case. A head mirror and a nest of aural speculums should be supplied to the medical chest. A commode chest is more desirable than the box of bedpans.

In the field the regimental outfit will have to follow in the one escort wagon. The only supplies the medical officer will have available are those carried on one mule. The importance of a packsaddle for each expedition has been mentioned. It would be well to have the members of the Hospital Corps drilled in packing this saddle. The boxes of Army reserve dressings are especially constructed with this in mind, as they will stand rough usage in the field better than canvas bags or fiber cases.

The present method of not carrying tentage or other quartermaster supplies is considered to be best, so long as it is understood that on every expedition a certain amount will be required by the medical department. Ward tents for the field hospital are more convenient for transportation, but it is doubtful if they are as cool in the Tropics or as useful for marine expeditionary work as the Munson or Gilchrist tents. A recommendation has been made to provide company ice boxes for future expeditions, using well constructed packing boxes for this purpose, the inner box being lined with zinc. While at

Vera Cruz the standard Army incinerators proved their value, and it has been recommended that the material (brick, 340; lime, $\frac{3}{4}$ bag) be carried among the quartermaster stores for their construction.

In concluding this report I wish to express my appreciation of the work done by the personnel of the medical department of this brigade. The medical officers were keenly alert to every need of their organizations, and it was through their loyal cooperation that such excellent results were obtained. The total number of the hospital corpsmen in the marine brigade did not equal the number in the Army field hospital alone, but they were quite sufficient for every demand. In spite of the intense heat, humidity, and monotony of the past seven months they were always ready for duty. If there had been an advance of the brigade, however, with resulting casualties from sickness and wounds, the relatively small number in the medical department would have been severely taxed. That this was not necessary has permitted the brigade to return with very little damage and considerable experience for the future.

**REPORT OF WORK AT THE FIELD HOSPITAL OF THE MARINE BRIGADE,
VERA CRUZ, MEXICO.**

By D. N. CARPENTER, Surgeon, United States Navy.

The field hospital of the marine brigade was opened on May 4, 1914, in a small schoolhouse assigned, Avenida Bravo, No. 59. By order of the brigade commander it was closed on September 24, 1914. The total number of days in commission was 143. During this time there have been 379 patients treated, a daily average of 31.5. Owing to the limited number of beds and the unsuitability of the building in many ways as a hospital, it was decided to care for the trivial cases of illness at the organization infirmaries. The 2 wards of the hospital when filled with cots accommodated 40 patients. At one end of the mess room there was a space for five or six more cots which were in use several times when the hospital was overcrowded.

Asst. Surg. G. Tully Vaughan, Medical Reserve Corps, United States Navy, was in command of the hospital from May 4 to July 14, with Asst. Surg. H. V. Cornett as an additional medical officer. The Hospital Corps attached consisted of 2 hospital stewards and 13 hospital apprentices. Upon the detachment of Dr. Vaughan the brigade surgeon assumed command, and Passed Asst. Surg. L. W. McGuire relieved Asst. Surg. Cornett. In addition to the above personnel there was a ship's cook assigned July 19, and an ambulance driver detailed from the Artillery battalion during the entire period.

The principal diseases treated consisted of venereal disease, malaria, and dysentery. Venereal disease has furnished a constant

source of invalidism, varying from 25 to 40 per cent of the total sick. Chancroidal infection with secondary bubo has been the most prevalent type. Malarial fever, from infection at Vera Cruz, reached its greatest severity in August. Estivo and tertian infections were about equally divided; the total number admitted to the hospital was 112. No case of quartan was seen. Dysentery appeared as an epidemic during May, June, and July, bacillary in type. There were 37 cases admitted, of which 4 were amebic, 2 cases having a history of infection prior to coming to Vera Cruz. All cases responded well to treatment by local irrigations. There was one death, an officer who had a comparatively mild attack, complicated with chronic nephritis.

There were three cases of contagious disease—one mild varioloid contracted during the house-to-house search of the city, one case of diphtheria, and one case of mumps; these patients were isolated in a tent at the Second Regiment camp.

Besides the one death from dysentery, there was one death from pericarditis, occurring in an old rheumatic case, and one death from pneumonia following an alcoholic debauch, the total number of deaths in the hospital being three, all from disease and none from injury.

Considering the primitive facilities of the operating room, the results obtained were excellent. There were 66 major operations, with no deaths, reflecting great credit on the skill of Dr. Vaughan, who performed the majority of the operations. His services while with the marine brigade were much appreciated and deserving of commendation for the promptness with which they were volunteered. There were 41 minor operations.

The work of clinical microscopy at this hospital has been considerable, comprising the following examinations:

Blood examinations:		Swab:	
For malaria	536	Gonococci	11
White counts	20	Diphtheria	4
Red counts	1	Diphtheria cultures	2
Sputum for tubercle bacilli	48	All others	7
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VOL. 9

NO. 2

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1915

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This United States Naval Medical Bulletin is published by direction of the department for the timely information of the Medical and Hospital Corps of the Navy.

TRUMAN H. NEWBERRY,
Acting Secretary.

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HARVARD UNIVERSITY

PREFACE.

The publication and issue of a quarterly bulletin by the Bureau of Medicine and Surgery contemplates the timely distribution of such information as is deemed of value to the medical officers and the Hospital Corps in the performance of their duties and with the ultimate object that both shall continue to advance in proficiency in respect to all of their responsibilities.

It is proposed that the Naval Medical Bulletin shall embody matters relating to hygiene, tropical and preventive medicine, pathology, laboratory suggestions, chemistry and pharmacy, advanced therapeutics, surgery, medical department organization for battle, and all other matters of more or less professional interest and importance under the conditions peculiar to the service and pertaining to the physical welfare of the naval personnel.

It is believed that the corps as a whole should profit, to the good of the service, out of the experience and observations of the individual. There are many excellent special reports and notes beyond the scope of my annual report being sent in from stations and ships, and by communicating the information they contain (either in their entirety or in part as extracts) throughout the service not only will they be employed to some purpose as merited but all medical officers will thus be brought into closer professional intercourse and be offered a means to keep abreast of the times.

Reviews of advances in medical sciences of special professional interest to the service, as published in foreign and home journals, will be given particular attention. While certain medical officers will regularly contribute to this work, it is urged that all others cooperate by submitting such abstracts from the literature as they may at any time deem appropriate.

Information received from all sources will be used, and the bureau extends an invitation to medical officers to prepare and forward, with a view to publication, contributions on subjects relating to the profession in any of its allied branches. But it is to be understood that the bureau does not necessarily undertake to indorse all views and opinions expressed in these pages.

W. C. BRAISTED,
Surgeon General, United States Navy.

U. S. NAVAL MEDICAL BULLETIN.

VOL. 9.

APRIL, 1915.

No. 2.

SPECIAL ARTICLES.

THE OPERATIVE TREATMENT OF CHRONIC INTESTINAL STASIS.¹

By WILLIAM SEAMAN BAINBRIDGE, Assistant Surgeon, Medical Reserve Corps, United States Navy.

It is a far cry from the massive piles of brick and mortar, cement and marble, steel, and iron which civilized man of to-day labels the up-to-date apartment house, the modern hotel, the fireproof "skyscraper," to the cave-dwellings, the mound-buildings, the kitchen middens, the dugout and hovel, which, to primitive man, meant "home."

Those of us who are accustomed to what we call modern sanitation can hardly imagine the life of men of olden times, when the scavengers of field and forest removed for human beings the disease-breeding refuse of communal and individual life. So accustomed have we become to the facilities of modern life that we have almost lost sight of the evolution, through slow and tortuous stages, of sanitary science as we know it to-day. The plumber and the plumb line have been greater factors in the development of civilization and the maintenance of health than the casual thinker would imagine.

The trend of the times in the matter of house building has been steadily toward improvement in every detail. Now, even in rural districts, the housewife is relieved of many of her erstwhile domestic burdens by the sanitary house builder, or by the architect who is an adherent of modern efficiency methods.

As it is with the home and the business house, so it is with the sanitation of the country, the village, and the city. The fact that the laws of sanitary science have penetrated even the jungle and the swamp is proved by the history of the wonderful campaigns which have been waged for the eradication of yellow fever, malarial fever, and certain other scourges which are known as filth diseases.

So much for the evolution of sanitary science as applied to the home, the business house, the country, the village, and the city. What about *human plumbing*? Have we improved upon the methods of the cave dweller and the mound builder? Are our bodily houses so well drained and ventilated, so well regulated in

¹ Presented, in part, by invitation, with stereopticon illustrations, before the Association of Railway Surgeons of New York and New England, Oct. 21, 1914; presented in full, by invitation, before the United States Naval Medical School, Washington, D. C., Nov. 24, 1914.

their respective parts, and so perfect in their entire sanitary system that we may compare favorably the human body of civilized man with that of our primitive forefathers? May we compare, in this regard, the progress of human nature, broadly speaking, to the world at large? Has the human country, with its cities of cells, its mountains of muscle, its rivers of blood, its lakes of lymph, and its marvelously intricate system of communication one part with another—the central nervous system and its branches—reached as perfect a stage of plumbing and sanitation as has the country at large, with its well-drained valleys, its cabled mountains, its well-ordered cities and villages, its purified lakes and streams, and its wonderful systems of communication? Not absolutely so.

Coincidental with the perfection of sanitary science as applied to the home, the hotel, the apartment house, the tenement, the "skyscraper," the "loft," even the "sweatshop," the country, the hamlet, and the city, has there been developed a general system of human plumbing notable alike in countryside, in hamlet, and in metropolis? I think not.

The complexities of civilization seem to have made for detriment to rather than improvement in human plumbing, or, rather, to the keeping in good condition by the individual of the system of sanitation with which nature has equipped the human species.

The savage who roamed the fields and forests in search of food, and who "mumbled the bones" of his prey when captured, seemed, from all accounts, to have suffered none of the results of defective human plumbing to which civilized man, with his complexity of pursuit and his refinements of diet, is the victim.

The simple existence, the rough, coarse food, the habits of life born of natural and normal impulses, tended to keep primitive man literally "half brother to the ox." It can not be doubted that lower animals and primitive human beings suffer temporary interferences with body drainage, but those who have studied aborigines and animals in their native state know how perfect is their system of body plumbing compared with that of civilized man. It is well known that animals in the wild state, and even some domesticated animals, such as the cat and the dog, promptly endeavor to remedy temporary interferences with body drainage by seeking out the herb which racial experience or instinct has taught will correct the defect. It is also a matter of ancient record that certain birds, notably the sacred ibis of the Egyptians, give themselves enemata, introducing water for the purpose with the beak "into the channel by which our health demands that the residue of our food shall leave."

When we pass, however, from lower animal to lower man, and on through the various stages of evolution to that which we are accustomed to call highest civilization, we encounter a most anomalous

state of affairs. All the accessory factors which make for perfect body sanitation; i. e., skin, teeth, salivary glands, are more or less defective or their function more or less impaired. The exceptions rather prove the rule. As a consequence, more work, or work of an unaccustomed quality, is thrown upon the essential factors, the stomach and the intestines.

If, perchance, the stomach is not fully equal to the superimposed task, which is so often the case in consequence of the many abuses to which it is subjected, it sends the food on into the intestines improperly prepared. Or perhaps the muscles of the stomach, overworked, are not strong enough to expel the food, so that it is left to ferment and decay, a further impairment of the drainage system takes place, and a condition of stasis supervenes in this vital portion of the sanitary plant.

Worst of all, however, is the crippling of that portion of the drainage system which we know as the intestine, both large and small. This tortuous canal, with its approximate length of six times that of the body, furnishes fruitful soil for abnormalities resulting, many believe, from man's changed estate, as may be seen from the illustrations presently shown.

The drainage system of the body, like that of the house or the city, is subjected to mechanical laws. According to some students of comparative and developmental anatomy, the assumption by man of the upright posture, as opposed to the all-four posture of lower animals, has called for a reconstruction of the mechanical principles governing body drainage. Portions of the alimentary canal which, in lower animals, were essential to or at least important in the processes of digestion, assimilation, and elimination, are now considered by some investigators to be rudimentary, nonfunctioning, or, if functioning, not a necessary part of the great plumbing system by which the perfect sanitation of the body is maintained.

Thus, in 1901, Sir W. Arbuthnot Lane, of London, for the first time, having reached the conclusion that the human cecum and ascending colon, acting as a "cesspool," might safely be eliminated, suited the action to the theory by excluding the large intestine from the drainage scheme, performing in certain cases his now justly celebrated "short circuit" operation (ileo-colostomy), and later his operation of ileo-colostomy with colectomy.

A year later (1902) Dr. Barclay Smith, of Cambridge, England, expressed the belief that the large intestine is practically a useless encumbrance to man.

In 1903 Metchnikoff's famous book, *The Nature of Man*, voiced this new doctrine in such decisive terms as to lend to the idea a more popular phase. "It is no longer rash," he stated, "to say that not only the rudimentary appendix, the cecum, but the whole of the

large intestine are superfluous, and that their removal would be attended with happy results."

In substantiation of his views and in vindication of his surgical procedures, Lane has elaborated the mechanical principles upon which he believes the human plumbing system operates, and has directed attention to the important part played in the life history of the individual by a delay in the passage of material along this great drainage canal, the alimentary tract.

According to Lane's theory, the mechanical relations of the alimentary tract, particularly of the large bowel, are changed in consequence of the assumption by man of the erect posture, and the results of these changes are augmented by the sedentary habits of civilized man.

In consequence of the upright position there is a tendency to general and persistent enteroptosis, particularly marked with reference to the large bowel, as is shown diagrammatically by Lane in figure 1.

Nature attempts to relieve the strain of this persistent enteroptosis, and the dragging of the displaced bowel is offset, as it were, through hypertrophy of its membranous supports "the crystallizations of lines of force," "the crystallizations of resistances," a physiological response to a mechanical demand.

This change in the mechanical relations of the large bowel is brought about primarily by the overloading of the large gut and of that portion which serves more especially as the cesspool of the gastro-intestinal tract, i. e., the cecum and the ascending colon.

Through the changed mechanical relations of the bowel, intestinal surfaces not normally in contact come into opposition, with the result that adhesions are formed, which interfere further with the passage of material through the lumen already constricted in consequence of the enteroptosis.

On other occasions I have discussed the etiology of these "crystallizations of resistance," variously called "bands," "folds," "veils," and "membranes," and need not do so here. I may say, however, in passing, that while some of these intra-abdominal structures are, perhaps, of congenital and others of inflammatory origin, the mechanical or evolutionary theory by which Lane has explained their existence seems best to account for a major proportion.

Whatever their etiology, and wherever their location, neither they nor the parts of the drainage system involved should be considered as separate entities. In the light of Lane's success, and that of Rutherford Morrison and many others of his followers, in the treatment of tuberculosis and other affections by the correction of the condition of chronic intestinal stasis, it is apparent that the entire problem of body drainage may best be solved by a consideration of

Bainbridge—Intestinal Stasis.

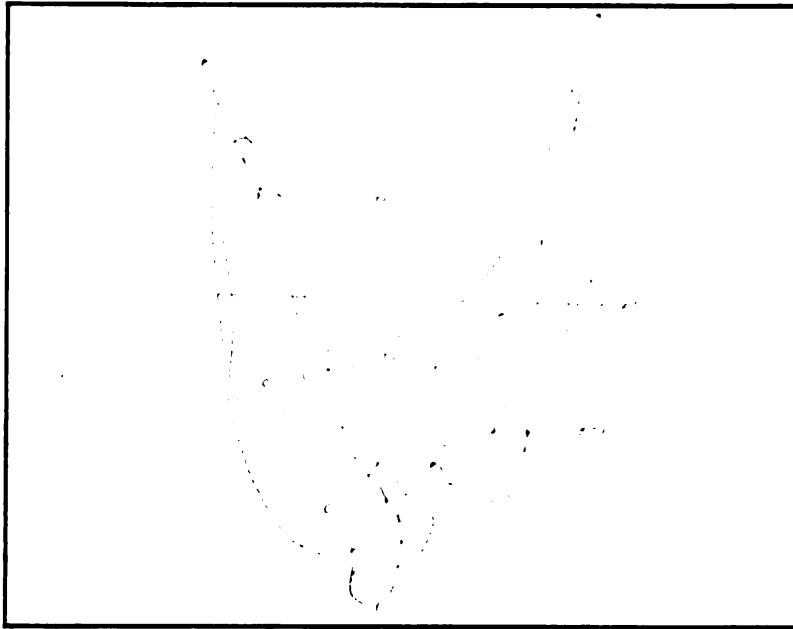


Fig. 1.—Diagram (from Lane) representing the several variations from the normal which the large bowel may undergo. The normal condition is shown as a firm line; the altered condition as a dotted line. Note the prolapse of the cecum and transverse colon, the telescoping of the iliac colon and the elongation of the pelvic colon. C, cecum; TC, transverse colon; BTP, brim of true pelvis; IC, iliac colon. The hepatic and splenic flexures are drawn up and kinked by the development of acquired resistances, shown as arrows.

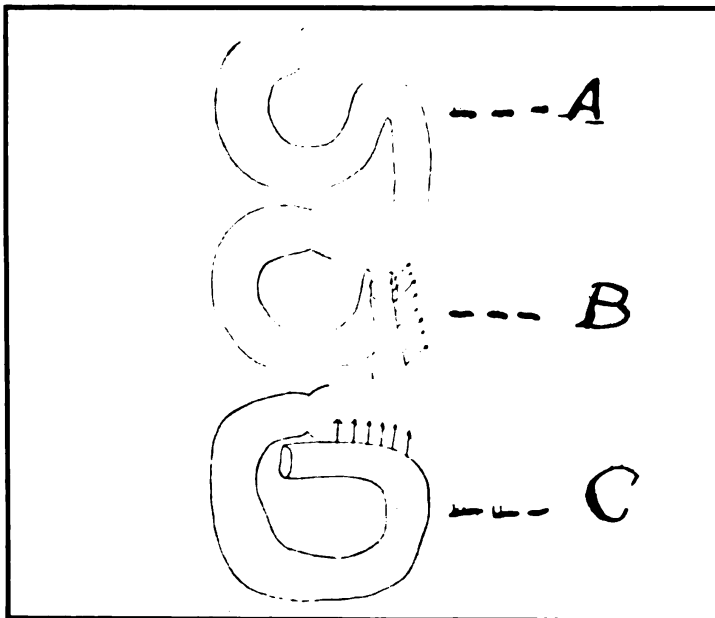


Fig. 2.—Diagram (from Lane) representing: A, normal curve of duodeno-jejunal junction; B, angulation of duodeno-jejunal junction by bands; C, nature's efforts, by the formation of bands, to prevent angulation.

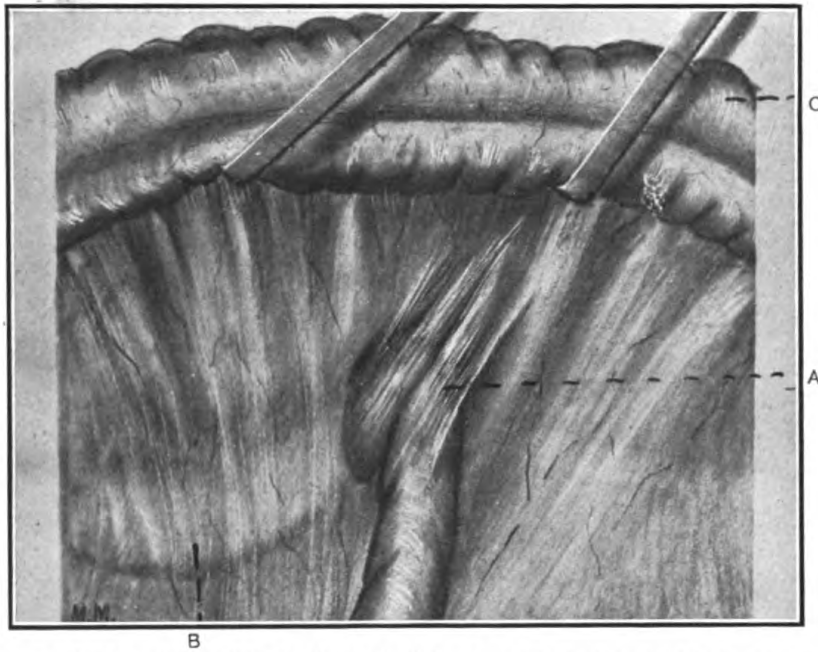


Fig. 3.—A, duodeno-jejunal kink; B, dilated duodenum, showing thin omentum; C, transverse colon held up.

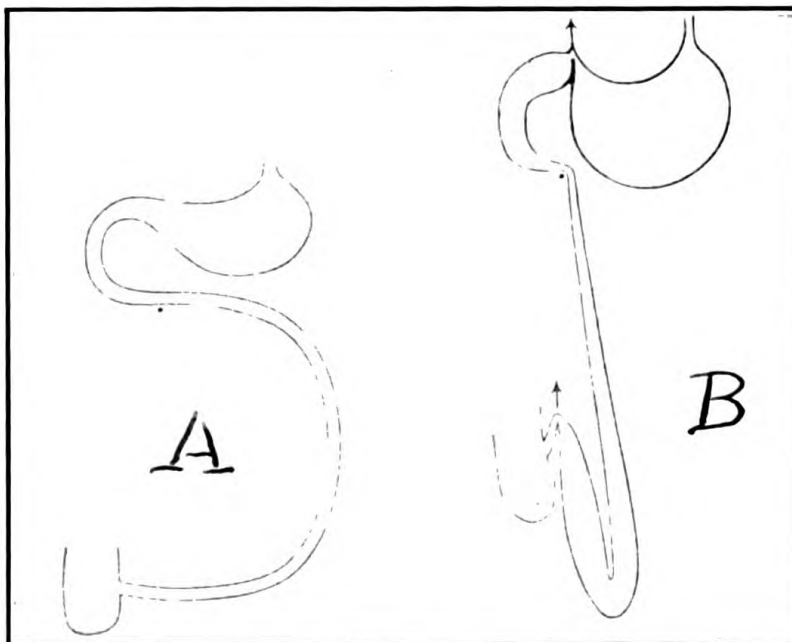


Fig. 4.—A, normal condition of stomach, small intestine and cecum; B, the several changes which result from ileal obstruction.

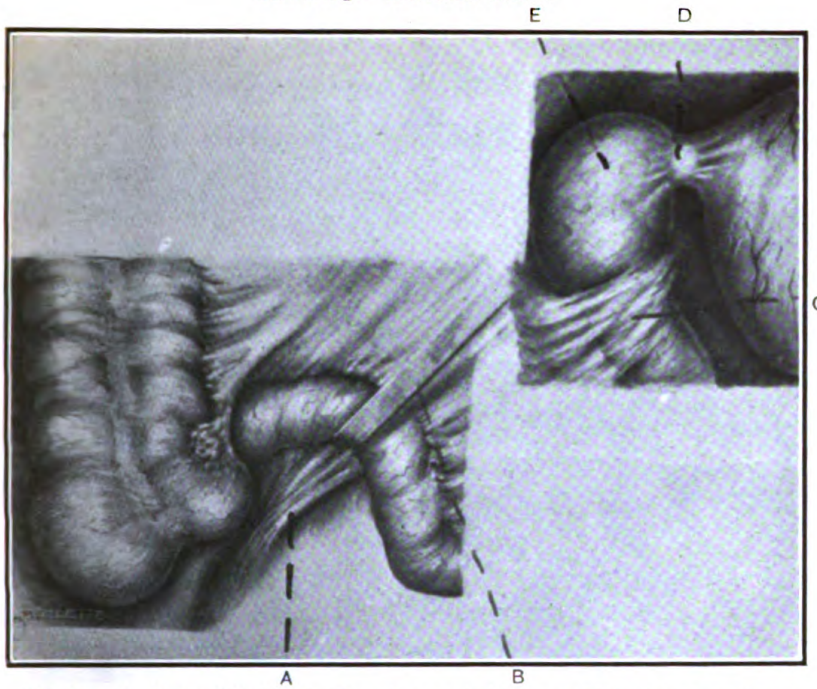


Fig. 4a.—A, ileo-pelvic band; B, retractor holding up kinked and dilated ileum; C, band restricting duodenum; D, ulcer constricting pyloric outlet; E, dilated duodenum.



Fig. 4b.—A, ileo-pelvic band; B, ileal kink; C, omentum adherent to cecum, which is twisted thereby; D, omentum extending from stomach and adherent to cecum and ascending colon.

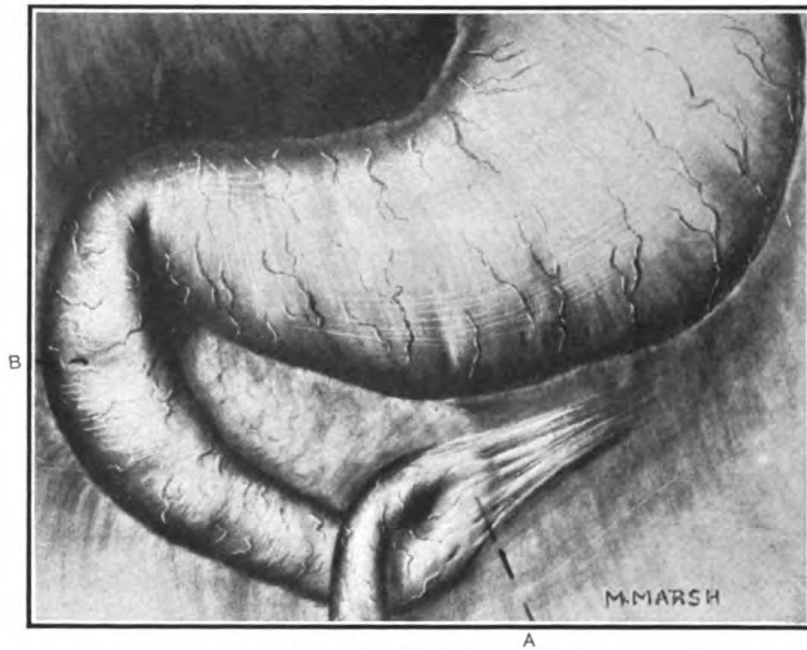


Fig. 4c.—A, duodeno-jejunal kink; B, dilated duodenum.

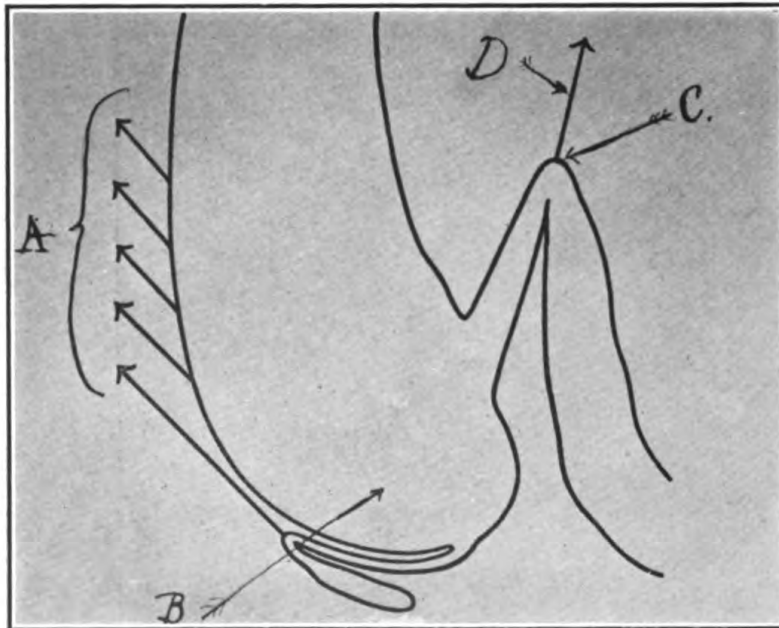


Fig. 5.—A, "Jackson's membrane," the lower part of which involves the appendix; B, the distended loaded cecum; C, ileum kinked by band D; D, band kinking ileum.

Bainbridge—Intestinal Stasis.

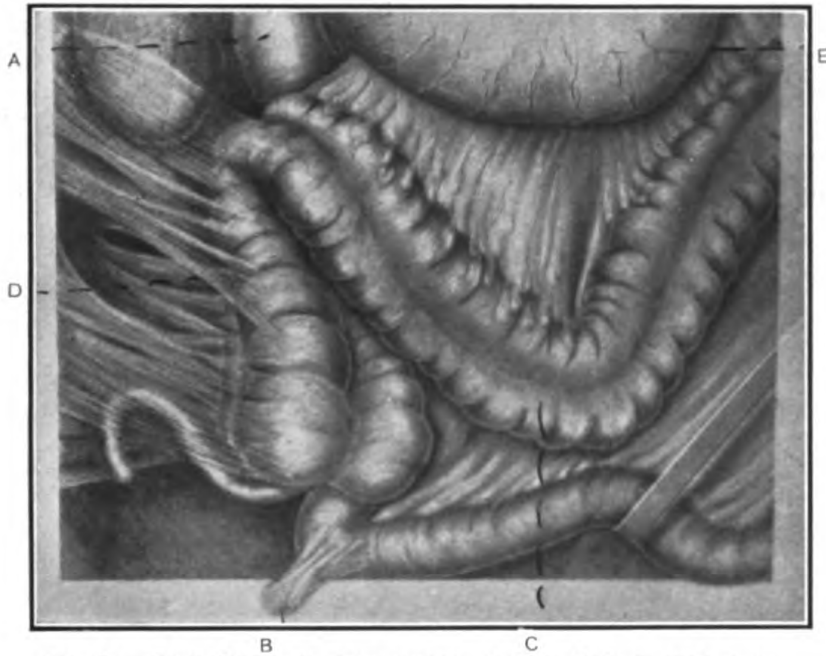


Fig. 5a.—(From British Medical Journal, Nov. 1, 1913) A, dilated duodenum, angulated duodeno-jejunal junction; B, Lane's band (ileo-pelvic) and kink; C, prolapsed transverse colon; D, "Jackson's membrane;" E, dilated stomach.

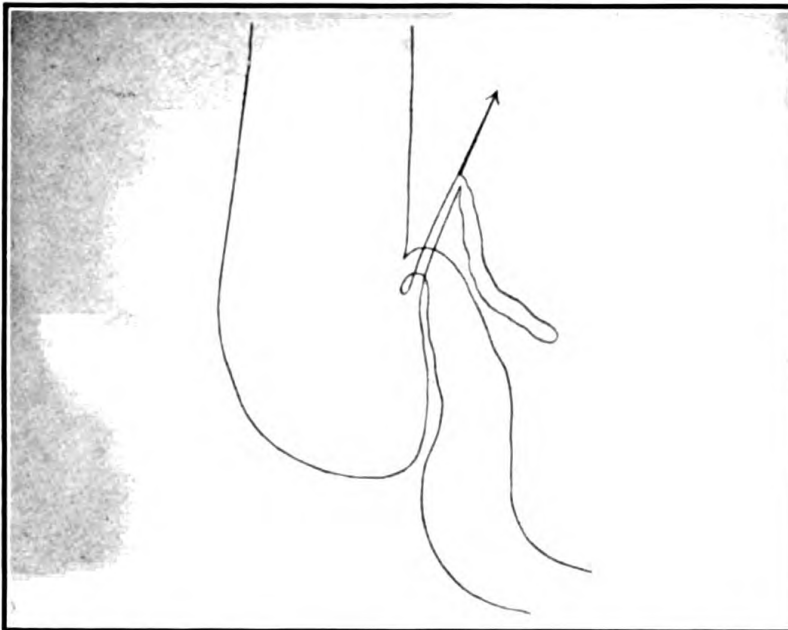


Fig. 6.—Diagram (from Lane) representing "appendiceal tie," with ileum kinked above by the appendix and distended below.

Bainbridge—Intestinal Stasis.

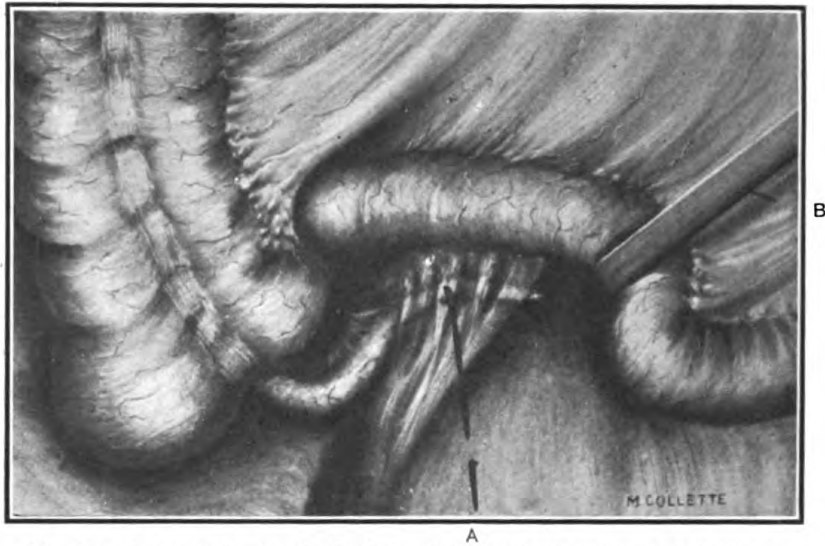


Fig. 6a.—A, appendix caught in ileo-pelvic band; B, retractor holding up ileum, which when dropped falls over appendix and forms an "appendiceal tie," as shown diagrammatically in Fig. 6.



Fig. 6b.—Another illustration of the "appendiceal tie;" A and B the same as in Fig. 6a.

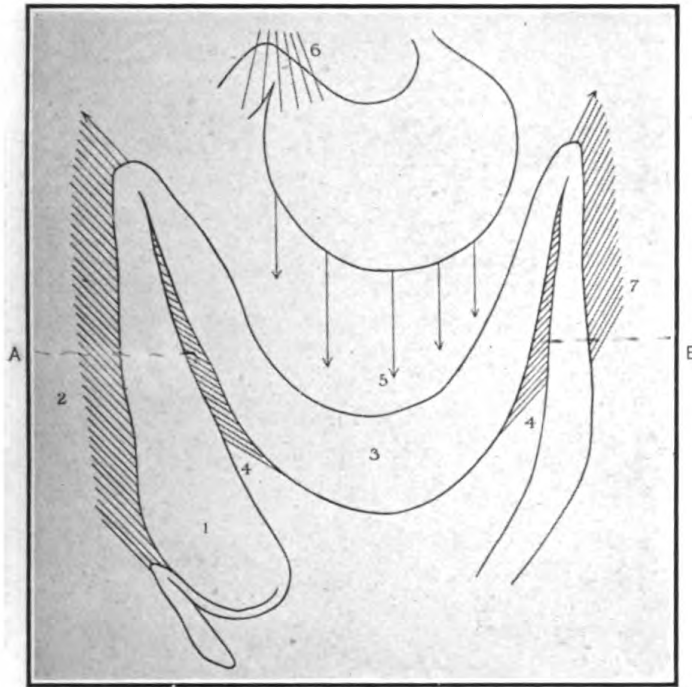


Fig. 7.—Diagram (from Lane) representing: 1, prolapsed cecum; 2 and 7, the crystallized resistances which tend to oppose the downward displacement of the large bowel and sustain some of the weight of the transverse colon transmitted through the crystallized resistances, 4; 3, transverse colon; 4, crystallized resistances; 5, portion of the weight of the transverse colon transmitted through the great omentum to the convexity of the stomach; 6, the acquired ligament that secures the duodenum and pylorus to the under surface of liver and gall bladder; A, bands between ascending and transverse colon; B, bands between transverse and descending colon.

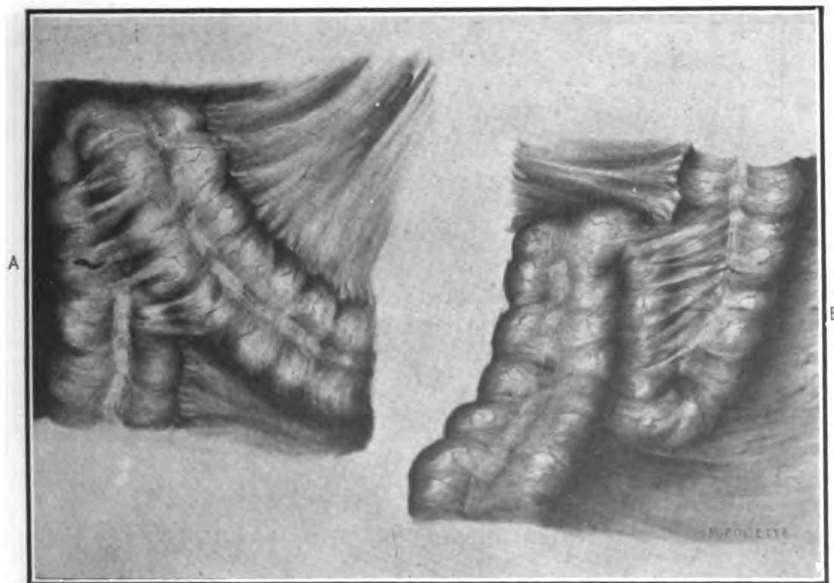


Fig. 7a.—A, bands between ascending and transverse colon; B, bands between descending and pelvic colon.

Bainbridge—Intestinal Stasis.

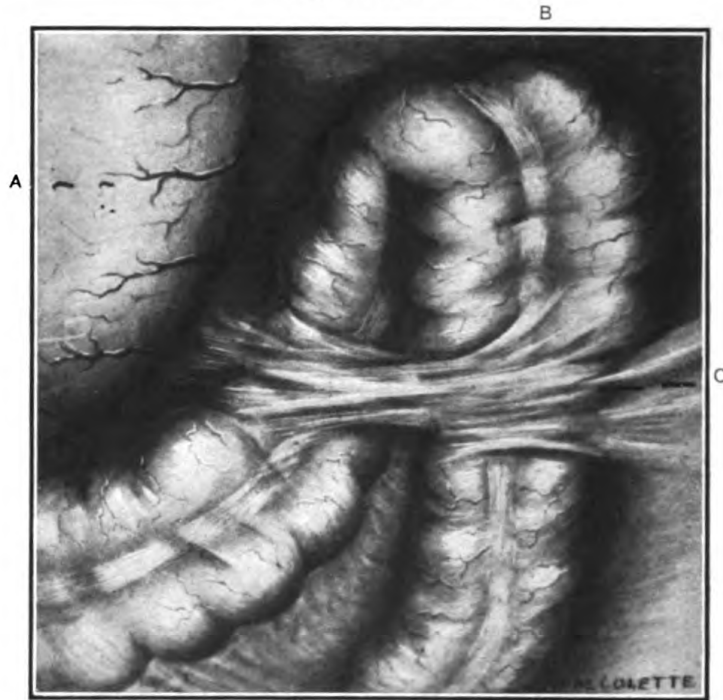


Fig. 7b.—A, dilated stomach; B, splenic flexure; C, band constricting descending and end of transverse colon, causing considerable obstruction.

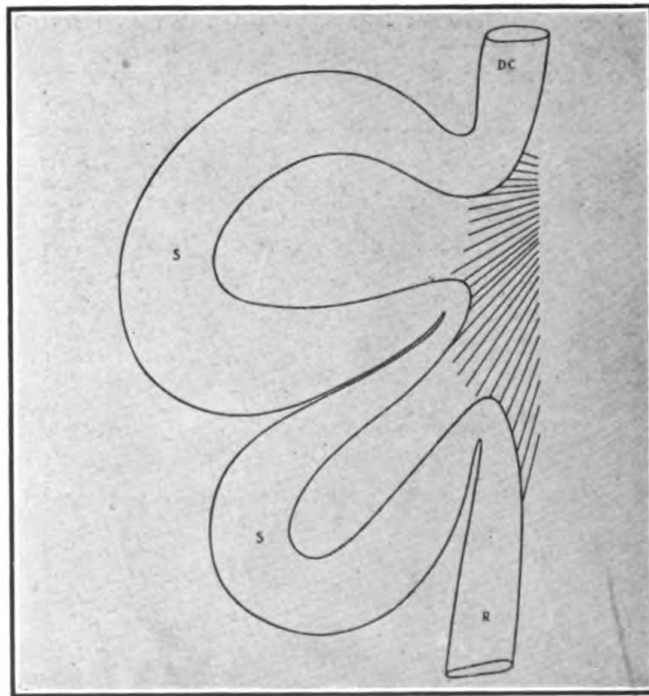


Fig. 8.—Diagram (from Lane) showing fixation and obstruction of pelvic colon.

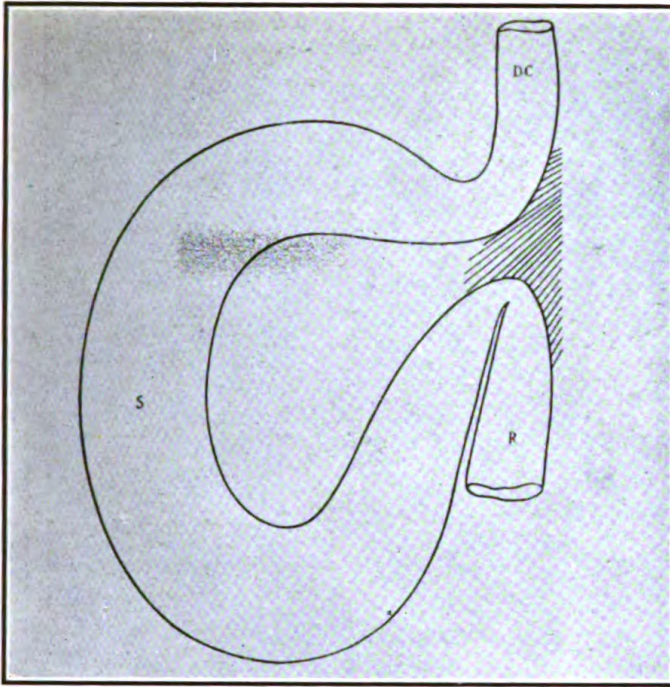


Fig. 8a.—Diagram (from Lane) showing diverticulitis of sigmoid produced by approximation of the two ends of loop of pelvic colon.



Fig. 8b.—Elongation of pelvic colon, with the formation of bands in the condition of acute obstruction by volvulus around the bands.

Bainbridge—Intestinal Stasis.

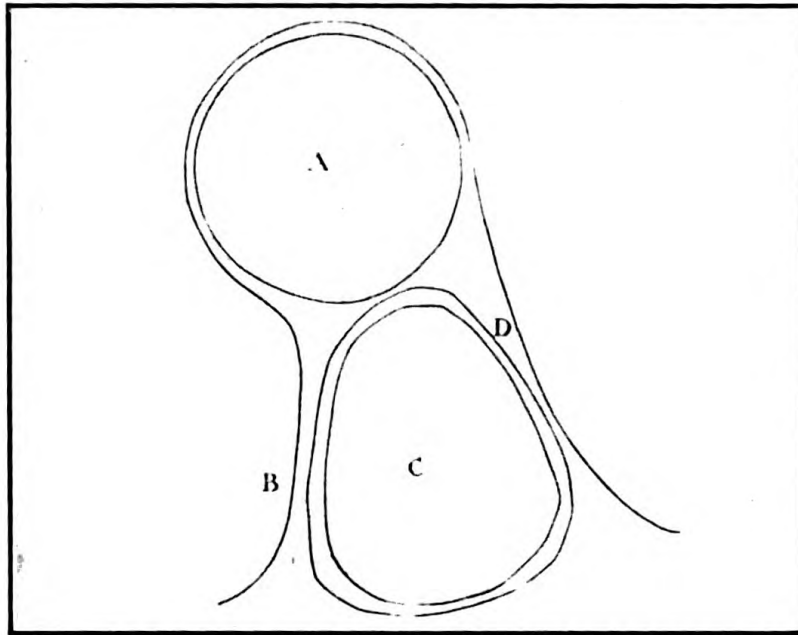


Fig. 9.—Diagram (from Lane) showing: A, colon in transverse section; B, original mesentery; C, cystic ovary lying free in a cavity; D, remains of acquired adhesions.

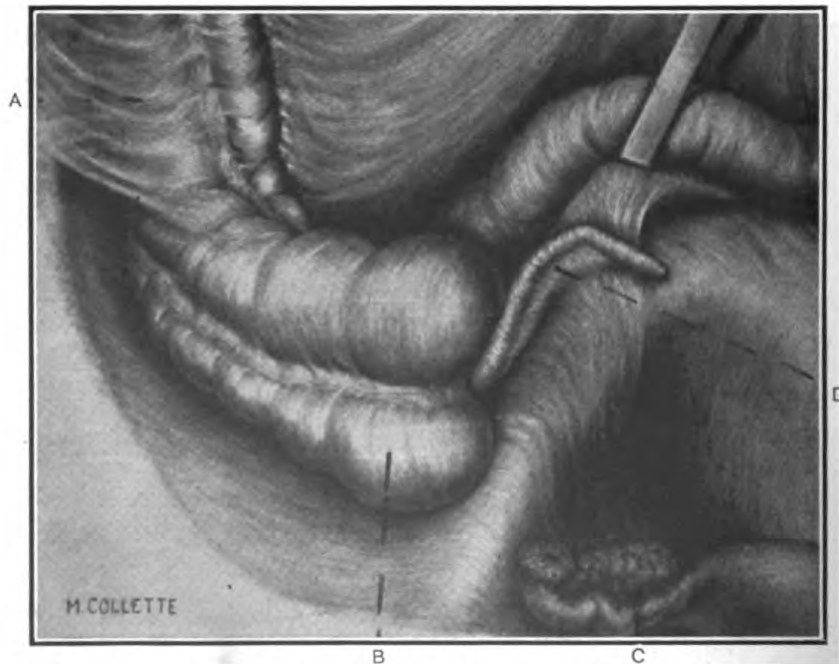


Fig. 9a.—A, pericolic membrane ("Jackson's membrane"); B, mobile cecum; C, "appendiceal tie;" D, ovary involved in ileo-pelvic band.

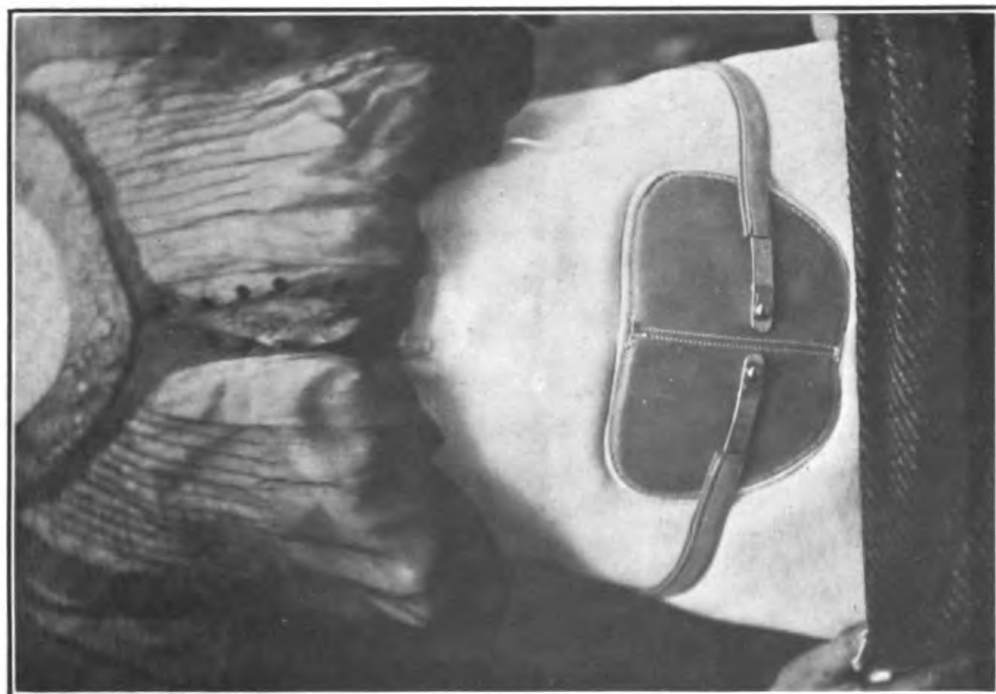


Fig. 10.—Curt's abdominal belt in position, front view.

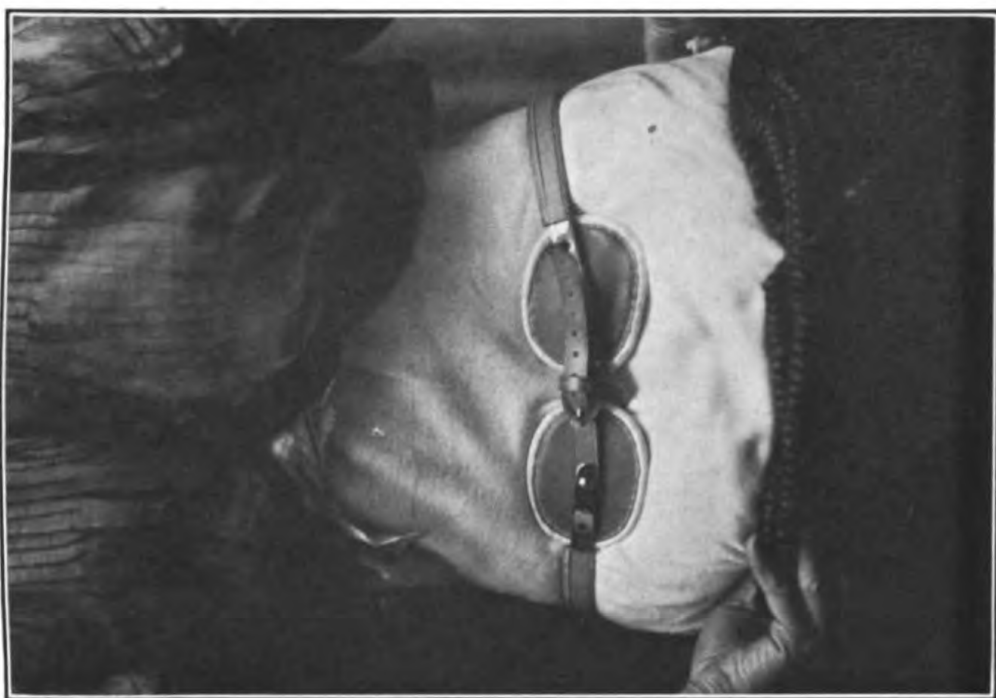


Fig. 11.—Curt's abdominal belt in position, back view.

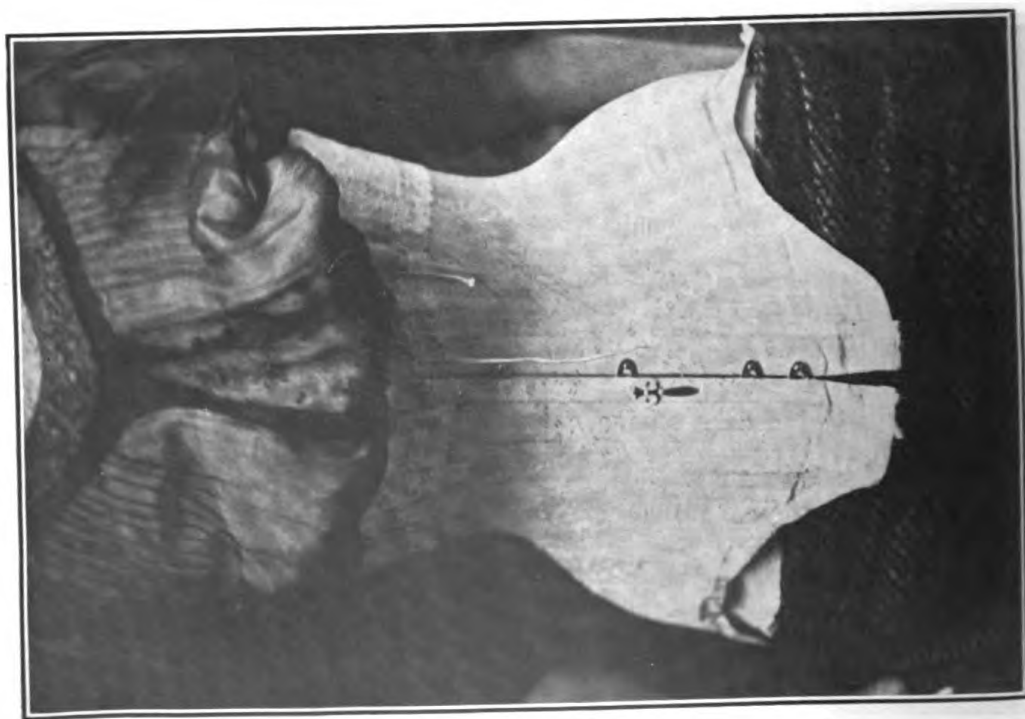


Fig. 12. Curtis abdominal belt in position with corset over it, front view.

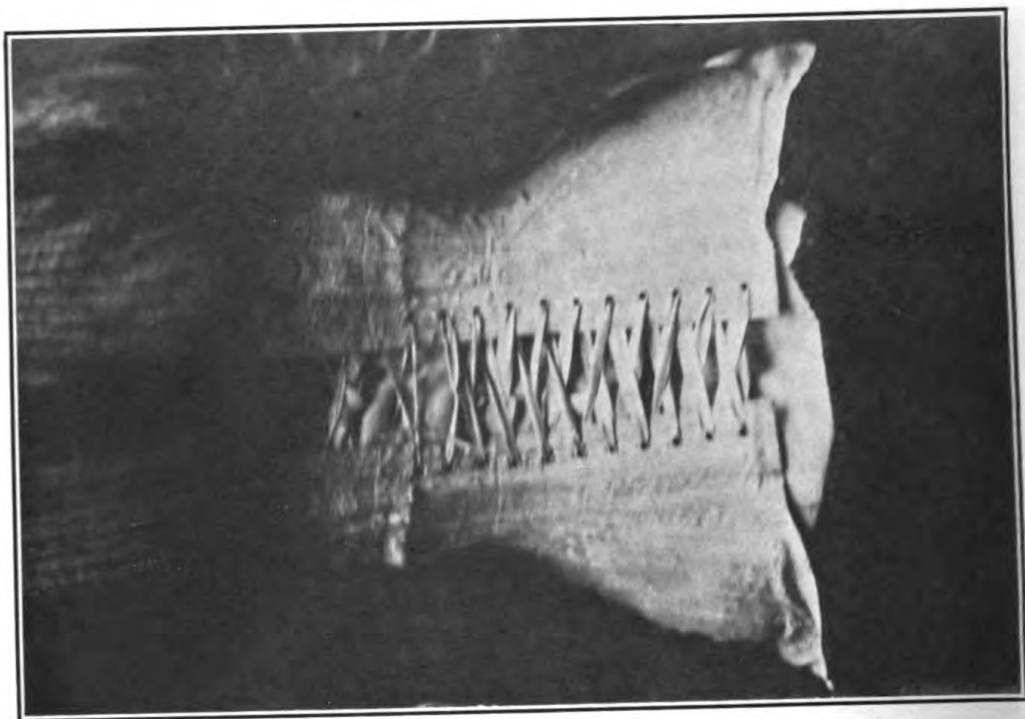


Fig. 13. —Curtis abdominal belt in position with corset over it, back view.

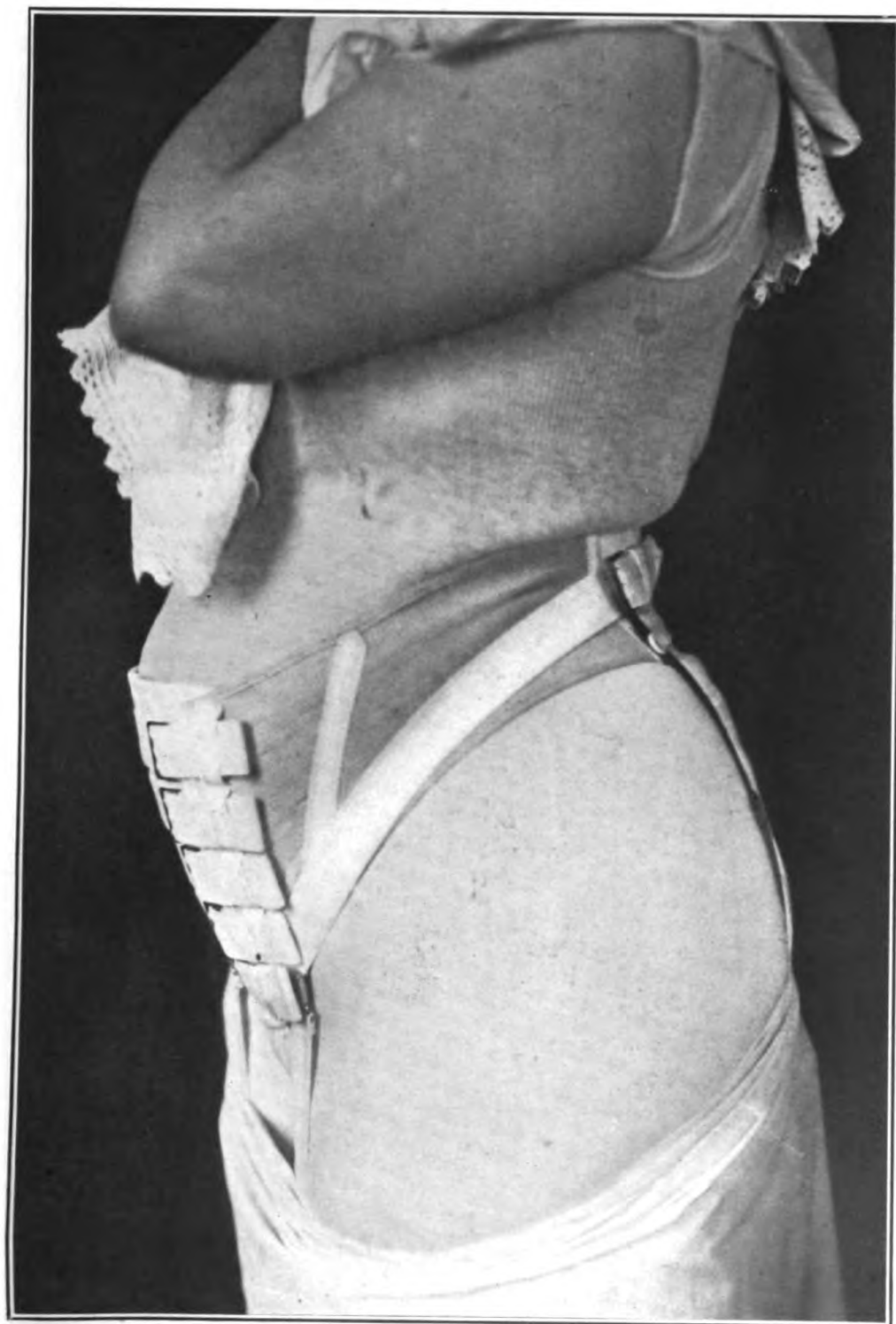


Fig. 14.—Moshier belt, side view.

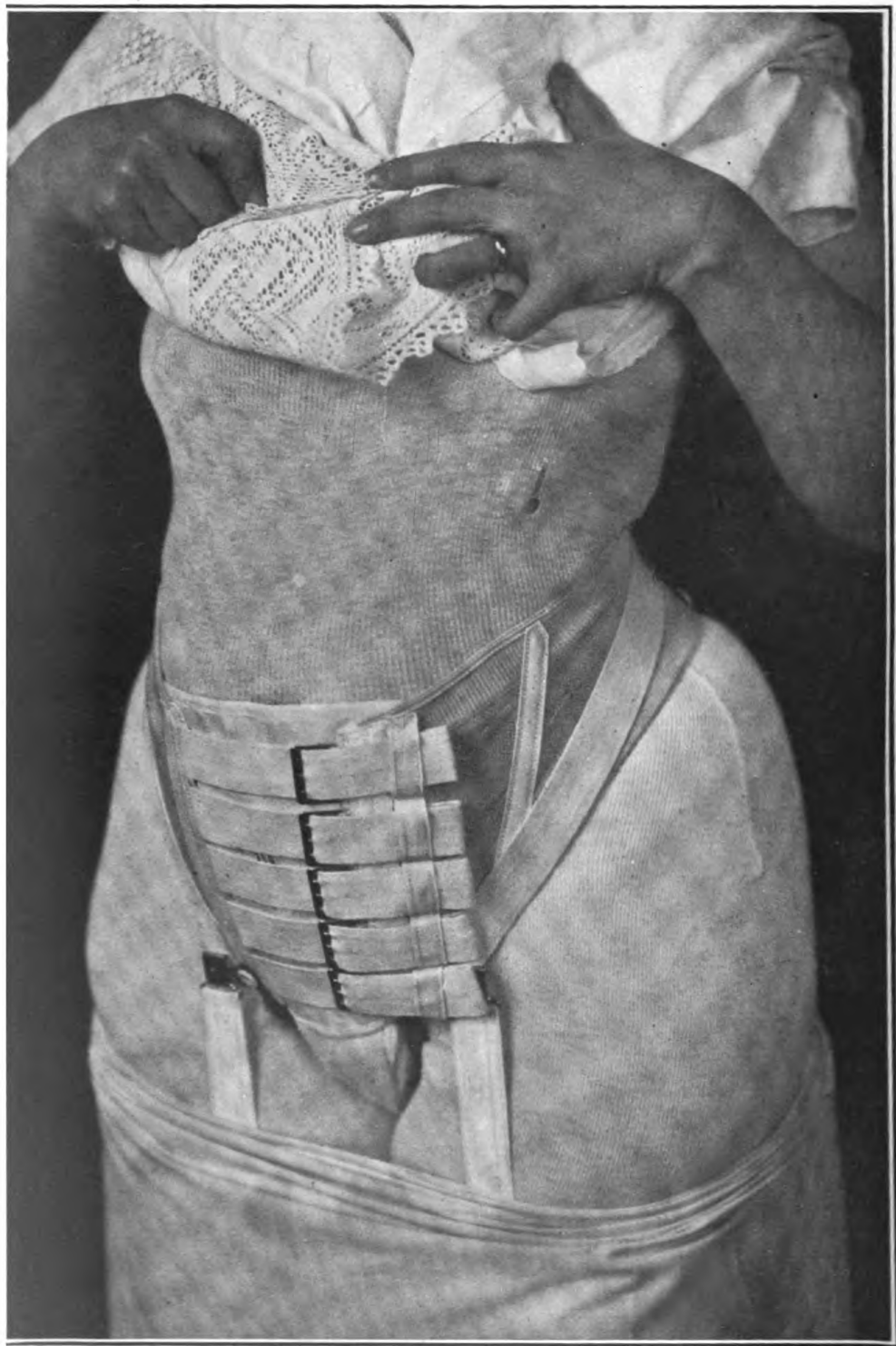


Fig. 15.—Moshier belt, front view.

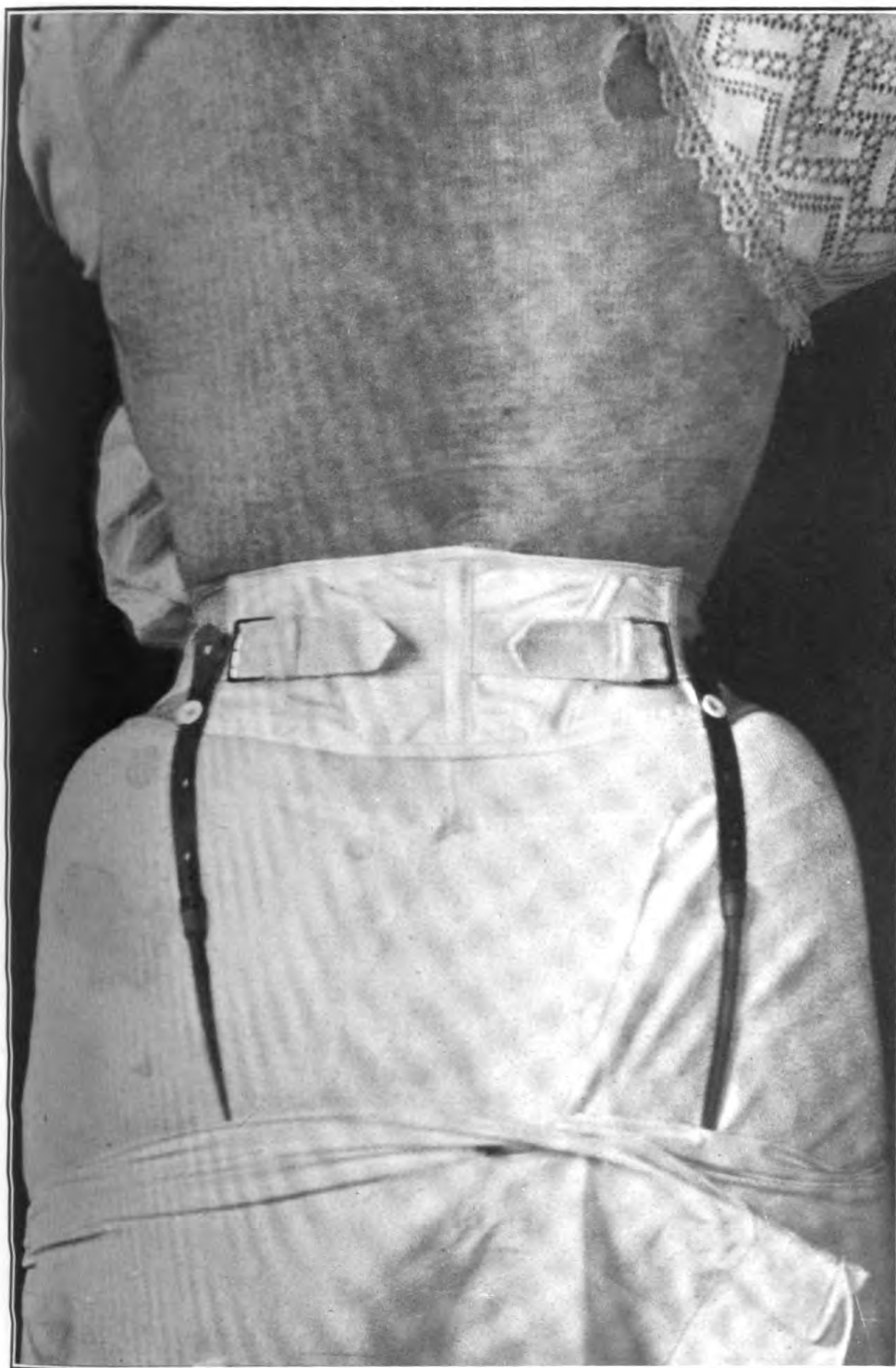


Fig. 16.—Moshier belt, back view.

the digestive system as a whole. The interesting researches of Carrel with reference to *in vitro* tissue growth, by which he has demonstrated that the death of tissues is due to an inability to eliminate waste products, has given added force to Lane's practical work.

Bearing these facts in mind, let us consider briefly the immediate results of the development of the crystallizations of lines of resistance to downward displacement of the drainage canal.

Lane has shown that these adventitious intra-abdominal structures were formed by nature, in the first instance, for the purpose of offsetting the newly acquired visceroptotic tendency, and of facilitating drainage. In consequence, however, of an unequal support in different portions of the canal, these structures may and do become the cause of very material obstruction as the result of the kinking of the gut to which they give rise. This obstruction occurs most frequently at certain points of predilection, which are illustrated below.

In order to properly interpret the pictures, it is necessary at all times to bear in mind the idea of a fixed point in the length of the gut (the attachment of the band), and the dropping of the hollow viscus on either side of this fixed point, with kinking and narrowing of the lumen.

The points of predilection are as follows:

(1) *In the third part of the duodenum, at the duodeno-jejunal junction.* Figure 2 illustrates, diagrammatically: (A) The normal curve of the small gut at this point; (B) angulation of the duodeno-jejunal junction by bands; (C) nature's efforts, by the formation of "resistances," to prevent angulation. Fig. 3 (reproduced, fig. 13, from the Medical Record, September 27, 1913), at (A) shows the kink of the duodeno-jejunal junction as actually found at the operating table.

(2) *At different points along the terminal ileum.*—The normal condition of the stomach, small intestine and cecum, and the several changes which may result from ileal obstruction, are schematically given in fig. 4, (A) and (B). Figs. 4a, 4b, and 4c illustrate, as found at operation, the results which may follow the kinking of the terminal ileum by bands, according to Lane's theory.

(3) *In the ileo-cecal region, including the appendix.*—The appendix may be variously involved. In fig. 5 it is diagrammatically shown caught to the right in the folds of so-called "Jackson's membrane." The same condition was found at the operating table, as shown in fig. 5a.

In the schematic illustration, fig. 6, the "appendiceal tie" is represented. Figs. 6a and 6b represent the same condition as found in different patients at operation. In each case the appendix is caught with the adventitious band, and the cecum and ileum are distended with intestinal contents. When the ileum, which is

shown in the figures as it is held up, is allowed to fall it drops over the appendix, and becomes kinked thereby, as shown in the diagram.

(4) *In the region of the hepatic flexure and the first part of the transverse colon.*—Fig. 7 shows this diagrammatically at (A). Fig. 7a shows it as found at operation.

(5) *At the splenic flexure.*—This is diagrammatically shown in fig. 7, at (B), and as found at operation in fig. 7b. (Same case as 7a.)

(6) *At the sigmoid loop.*—This is diagrammatically given in figs. 8 and 8a, and as found in the patient in fig. 8b.

(7) *In the pelvic colon or rectum.*—Sometimes the band which causes what Lane has called "the last kink," at the junction of the iliac with the pelvic portions of the colon, attaches itself to the ovary, as shown diagrammatically in fig. 9, and in an actual case in fig. 9a. The rectum may be involved in the kink.

I have endeavored to demonstrate in the foregoing pictures the alterations which may take place in the drainage system in consequence of the change from the supine posture of lower animals to the upright posture of man, or as the result of an inflammatory process; to show how nature attempts, by means of evolutionary bands, to offset the tendency to visceroptosis; and to illustrate some of the mechanical obstructions which occur through the kinking of the canal by these adventitious structures.

As an immediate result of the kinking of the gut there is a slowing in the passage of the contents, varying in degree according to the location of the kink, the severity of the interference, and various other factors. To the immediate condition resulting from this interference Lane has applied the term "chronic intestinal stasis."

Referring to the idea, maintained by some, that he is investing "simple constipation" with new importance and significance, Lane has said: "To many members of our profession, constipation apparently suggests merely the absence of a daily action of the bowels, but what I understand by chronic intestinal stasis is an abnormal delay in the transmission of the intestinal contents through some portion or portions of the gastrointestinal tract, which delay may be accompanied by constipation or by a daily or even more frequent action of the bowels. In the complications which result, diarrhea may be the more important and troublesome feature. Or to put it more succinctly, chronic intestinal stasis means a delay in a portion or portions of the gastrointestinal tract, which results in the absorption into the circulation of more toxic matter than the organs, whose functions are to convert, convey, and eliminate it, can deal with."

"Simple constipation," which has been described as a "pathological condition characterized by insufficient fecal evacuation," and which is generally considered to involve the large bowel, particularly in its lower part, may exist to a marked degree without overtaking

the organs of digestion, assimilation, and elimination to such an extent as to give rise to the symptomatology of autointoxication. This may be true of the degree of constipation to which the term obstipation is usually applied.

With chronic intestinal stasis, however, as defined by Lane, far-reaching results may ensue. "The gastrointestinal tract," as he says, "is a living, sentient, drainage scheme, of which the several portions perform several functions, from which nutrient material is picked up by absorbing vessels, and into which certain organs discharge their contents. In some portions, organisms thrive normally; in others, the presence of the same organisms produces poisonous products which that segment of the tract is unaccustomed to deal with. These poisons, being absorbed, damage the tissues of the body, causing them to degenerate, and reducing their capacity to combat successfully organisms which may invade them. Any delay in the passage of the contents of this drainage scheme has a threefold result on the organisms found in the intestine. Their multiplication is facilitated, they extend beyond the limits of their normal habitat, and extraneous strains are developed. These organisms may extend along the ducts of the organs which open into the drainpipe, and they or their products, carried in the blood stream, may infect organs which do not directly communicate with the intestine, for example, the kidneys." "The excess of these poisons," he continues, "circulating through the body can not be dealt with effectually by those organs whose business it is to render them as innocuous as possible. They produce progressive degeneration in every tissue, and a very definite and unmistakable series of symptoms results." Every tissue of the body is affected to a greater or less extent.

It is not my purpose here, however, to discuss in detail either the immediate or the remote effects of the kinking of the gut and the resultant condition of chronic intestinal stasis.

Accepting, as I think one must do who brings to bear upon the entire subject an unbiased mind, the fact of the existence of the adventitious intra-abdominal bands, of the kinking of the gut thereby, of the conditions of stasis, and of the long chain of symptoms of autointoxication which follows, accepting all this as at least a possibility, if not a probability and in many cases an actuality, the question then arises, to whose lot does it properly fall to play the rôle of plumber in the work of overhauling the human drainage system which is out of order? The question must be answered equivocally.

From a study of Lane's work and his cases, both by personal observation and by reading his published reports, and from my own experience and that of others, I have come to classify my cases of

chronic intestinal stasis, according to treatment, under three general groups:

First group—beginning cases, in which, by preventive measures, a definite condition of stasis may be obviated.

Mid group—mild cases, in which, by preventive measures and by moderate surgical procedures, such as cutting bands, replacing hollow organs, changing angles, etc., the severer degrees of stasis are forestalled and the necessity of more radical surgical measures may be obviated.

End group—advanced cases, in which, despite preventive treatment, or because of inefficient treatment, the condition progresses to the degree of stasis which requires the more radical surgical procedures, such as short-circuiting (ileo-colostomy), or ileo-colostomy with colectomy.

The selection of the plumber, then, is governed by the category under which the patient comes. In cases of the first group the internist or the gastroenterologist, provided he is accustomed to avail himself of all the applicable diagnostic aids, particularly the X-ray and the fluoroscope, may make the diagnosis and apply the treatment with success. I have discussed this group of cases elsewhere and will not dwell upon it here.

The hygienic, dietetic, and supportive measures which are applicable in the treatment of patients of the first group are equally applicable in the after-care of patients of the other two groups.

An essential part of this treatment is a properly fitted abdominal belt. Figs. 10, 11, 12, and 13 illustrate the Curtis abdominal belt, which has been found efficacious in many cases of all classes, and figs. 14, 15, and 16 show a belt devised by Dr. Eliza M. Mosher, of Brooklyn, which is useful in selected cases.

In connection with the belt it may be added that the mere matter of ordering a belt is not sufficient; the belt must be adapted to the individual patient and must be properly applied at all times, as may be demonstrated by X-ray examination. Any belt which subserves the purpose may be used as a temporary support to aid nature in the restoration of tone.

While, as I have said, the skilful internist and gastroenterologist may successfully treat cases of the first group, some of these may be said to come equally properly, after all, within the domain of the abdominal surgeon, inasmuch as it is difficult to foretell when a case presenting the symptomatology of the milder degrees of stasis may come within the category of one demanding exploratory laparotomy and, perhaps, radical operative interference.

Mid-group cases, whether from neglect, from inefficient treatment, from unavoidable inflammatory processes, or despite careful management, many cases of chronic intestinal stasis progress to the stage in which preventive measures are insufficient. It then becomes neces-

sary to perform laparotomy for the purpose of applying surgical treatment, such as is illustrated in the accompanying pictures:

(1) *Cutting bands.* Fig. 17 illustrates two conditions: (A) Ileopelvic band, kinking the ileum, which is thinned between the cecum and the band and the resulting kink, and very greatly distended beyond the band and the kink. (B) Band attaching the ascending colon to the lateral abdominal wall, causing stasis in the cecum. Fig. 17a represents the condition after the bands have been cut, the raw surfaces covered, and the gut restored to its normal position and mobility. The appendix in this case had been previously removed by another surgeon without permanent benefit.

It is important, in connection with such cases, to remember that these bands should be cut transversely and sewed up longitudinally, thus giving greater play to the constricted portion of gut. Great care should be exercised, too, to prevent the leaving of any raw surfaces or rough edges, which would prove fruitful soil for the formation of adhesions.

(2) *Straightening kinks and angulations.* Figs. 17 (A) (previously shown) and 17a illustrate this, and likewise figs. 18 and 18a.

By straightening these kinks one can "iron out," so to speak, other conditions. Fig. 18b, for example, shows an ulcer of the duodenum, caused, if Lane's views be correct, by the condition represented in fig. 18. There was a constricting band across the duodenum (fig. 18b-A), but the cutting of this and the leaving of the condition around the cecum, appendix, and terminal ileum would not have cured the duodenal ulcer (fig. 18b-B). By removing the appendix, cutting the band (fig. 18-A), restoring the cecum to its normal position, and straightening the kinks in the ileum, plus the severing of the duodenal band, the patient was restored to normal health. Fig. 18c is another example of this.

(3) *Removing the appendix.* Figs. 18, 18a, and 18b have already illustrated the advantages of removing the appendix in some cases in which this organ plays a part in the kinking of the ileum and in the displacing of the cecum. Fig. 18c is a further illustration of this point.

(4) *Anchoring, plicating, or otherwise dealing with mobile or distended cecum.* The part played by the cecum in the production of chronic intestinal stasis has called forth much discussion and varied attempts have been made to deal with this particular part of the drainage canal in such manner as to relieve the symptoms caused by the undue extension or mobility.

Wilms devised a method of fixation of the elongated and mobile cecum in cases of "so-called appendicitis," which had for its object the making of a retroperitoneal pouch into which the cecum is placed. He claimed that flat adhesions are thus formed, which proved better than fixation by suture.

Blake proposed the method of plicating voluminous ceca. He advised it only as a palliative measure, and only when the abdomen is opened for another purpose. It consists in simply stitching the ventral and lateral longitudinal bands of the cecum and ascending colon together after removal of the appendix. A nonabsorbable continuous suture of silk or linen is used, and the stitches are placed about two centimeters apart, so that when drawn tight the length as well as the diameter of the gut is diminished. The plication is usually carried, according to Blake, ten to fifteen centimeters aborally.

I have employed the plication method, using interrupted stitches instead of the continuous suture, and extending the plication well up into the flank to a point where the gut is fairly well fastened to the abdominal wall. Figs. 19, 19a, and 19b illustrate the successive steps in the plication of cecum and ascending colon by this method.

(5) *Covering raw surfaces and preventing adhesions.* As all surgeons know, the prevention of adhesions has been and still is a surgical problem which has not been entirely satisfactorily solved. Cargile membrane, omental fat, paraffin, and various other agents have been tried, but none have met with unqualified success. It is particularly important, of course, in the abdominal cavity, that means be employed for the prevention of the formation of adhesions after surgical intervention.

Figs. 20 and 20-a illustrate the severing of broad bands (A and B). Fig. 20-a-B shows the covering over of the remaining raw surfaces with a piece of detached omentum. Fig. 21 depicts extensive band formation, and fig. 21-a illustrates the method of covering the raw surfaces by means of omentum not detached, but simply sutured in place over the area to be covered.¹

Lane has recently been employing the method of introducing several pints of normal saline solution into the abdomen, just before closure of the wound, for the purpose of preventing adhesions.

It is yet to be determined whether any of these, and the various other methods devised for the prevention of stasis in the cecum, will stand the test of time, and whether, after all, the cecum cases will not have to be carried over from the mid-group category, in which no attempt is made at removal, to the end group, in which removal of some portion or the whole of the large bowel, or at least diverting the course of the drainage, "to free the ileal effluent," is the object to be attained.

End-group cases.—When Lane first observed the kink produced by acquired ligaments or bands, according to his own statement, he set about to devise means for the division of the bands and the covering of raw surfaces thus exposed, and for treating the ileum in order to prevent the recurrence of the kink. He soon found,

¹ The cases pictured are both doing very well one year after operation.

however, that the freeing of the intestine sometimes resulted in an acute obstruction, the freed portion of the ileum refusing to transmit its contents. He also found that, even when the membrane had been divided and the patient had recovered from the operation, the toxic symptoms returned when active life was resumed. This, he says, was true in the more advanced cases. After extended experience, especially where bismuth and X-rays showed that the ileal obstruction was accompanied by a marked degree of stasis in the large bowel, he left the ileal kink alone, and short-circuited by anastomosing the divided end of the ileum with the pelvic colon immediately below the last kink, exaggerating the pelvic kink if necessary.

Fig. 22 represents a condition in which the bands produced a generally snarled-up state of affairs. Bands were cut (the appendix had already been removed by another surgeon), the kinks and angulations were straightened, the cecum was restored to its normal position; in short, everything was done that was feasible in the effort to cure the patient without subjecting him to a short-circuit operation, to which his physician would not agree.

Despite this, however, the patient returned one year later no better, and with the conditions found in fig. 22-a. Ileo-colostomy was then performed with perfect drainage.

Care of patient before, during, and after operation.—The care of the patient before, during, and after operation is the same for ileo-colostomy and for colectomy, and it is of the utmost importance in either case. As we have already stated, the hygienic, dietetic, and supportive measures which are applicable in the management of patients of the first group are equally applicable in the after care of patients of the other two groups.

In all cases of stasis it is well to bear in mind the possibility of acidosis. If the urine shows acetone, and if the body fluids are highly acid, a longer time is required for preparation for operation. I generally take a week or so longer, during which time plenty of alkaline fluids are given. If it is difficult to bring the urine down to the neutral point, the bowel may be irrigated with a solution of bicarbonate of soda for several days before operation. Dextrose water—a teaspoonful of dextrose to a glassful of French vichy—as often as it can be taken, is beneficial.

The immediate preparation of the patient for operation is commenced two days before. An ounce of castor oil is given, followed by a soap enema night and morning for two days. During this time the patient is kept on a strict liquid diet. The entire abdomen is subjected to the most careful sterilization. An hour before operation an injection of morphia, $\frac{1}{2}$ gr., with atropin sulphate, $\frac{1}{100}$ gr., is administered, followed by the vapor or open ether method of anesthesia.

When the patient is anesthetized, infusion needles are inserted subcutaneously into the axillæ, previously painted with iodine, and normal saline solution is administered throughout the operation, usually from 4 to 6 pints being absorbed. For this purpose Lane's hypodermoclysis apparatus is employed. A rectal tube is inserted during the operation, after the anastomosis is made and before the abdominal wall is closed. When the patient is returned to bed this tube, which is attached in place near the anal outlet, is connected with a long piece of rubber tubing, and drains into a receptacle at the side of the bed. It remains in for six days. The average drainage is about 14 to 20 ounces a day.

When completely recovered from the anesthetic the patient is placed in the true Fowler position, practically sitting upright in bed. It is important to so arrange the patient in bed that comfort is maintained, abdominal drainage secured, and the dangers of post-operative respiratory trouble reduced. For the first two days after operation the pulse is taken every hour and the temperature every four hours. The sutures are removed, as a rule, on the fourteenth day, and a gauze dressing applied. For the first two days the patient is given only water, egg albumen, beef juice, plasmon, peptonoids, and brandy for the next four days, going on gradually to jelly and custards. During convalescence nothing heavier than fish and chicken is given. Pure liquid paraffin (Russian mineral oil), 1 ounce or less three times a day for as long as is necessary, is given after the third day. The oil is no panacea, but merely acts as a lubricant, facilitating the passage of the intestinal contents. It may be noted that a pure, unperfumed oil is desirable, the aromatic oils, as a rule, being suggestive of impurities. It is better to add a little essence of orange or lemon, or the desired aromatic, as given. Milk of magnesia may be used as needed, if the Russian mineral oil is not borne well, or until the patient sits up. The patient is usually allowed up on a couch at the end of the fourth week, and is discharged at the end of the sixth week.

It is always to be remembered that the care of the patient is not ended with the operative procedure. Correcting the defects in the drainage system by surgical intervention merely makes it possible for the patient to become well. Unless nature is now assisted in her efforts at general restoration of the tone of the system, it will be no difficult matter for the patient to lapse again into an unsatisfactory condition. In order to prevent this, the hygienic, dietetic, and supportive measures previously mentioned in part must be employed until, like the crutches of the healed cripple, they may be discarded.

Technic of ileo-colostomy (short circuit).—The incision to the left of the median line divides both layers of the rectus and extends from about 2 inches above the umbilicus nearly to the symphysis

pubis. The peritoneum divided, and the parts properly protected by sterile cloths, a thorough examination is made of abdominal contents. Ileo-colostomy having been determined upon as the result of this examination, the ileum is grasped by two compression forceps, which are placed transversely across it and as close together as possible. The bowel between the forceps is cut through with the cautery. As a rule the point at which the ileum is severed is within a few inches of its termination, though this varies with circumstances. A suture is threaded through the distal end of the ileum, including the forceps in its several loops. The forceps are then removed and the thread tightened and knotted, this end of the ileum being thus secured. The sutured end is next invaginated. The pelvic colon is now drawn up into the incision, emptied of its contents, and grasped between the blades of Lane's gastro-enterostomy forceps. The proximal end of the ileum is emptied of its contents, and with a very light pair of compression forceps it is held in position against the part of the colon at which the juncture is to be made. An incision along the length of the colon is made of a size corresponding to the caliber of the ileum. The ends of the ileal aperture and of the aperture in the colon are secured by toothed forceps. The adjacent margins of the apertures in ileum and colon are now securely united by means of a buttonhole suture. The controlling forceps are removed, the ileo-colostomy junction reinforced by one or two additional rows of sutures which perforate the peritoneal and muscular coats, the small intestines are drawn upward out of the pelvis and are held in this position while the free surfaces of the pelvic mesentery are attached to the free surface of the mesentery of the ileum by a buttonhole suture. An esophageal tube (fig. 34) is inserted into the anus and passed along the rectum, its passage being facilitated by injecting paraffin into the tube by means of a Higginson syringe. The tube is passed through the opening in the colon and for about 12 inches along the ileum. It is secured in the anal region in the male and to the back of the vulva in the female. This is connected to the tubing and vessel referred to in the aftercare of the patient.

In some of his earlier cases Lane did a side-to-side anastomosis of the small intestine with the large. He found, however, that in some instances a diverticulum developed, as shown in fig. 23, which is one of Lane's own cases. It then became necessary to remove the diverticulum at a subsequent operation. In order to obviate this contingency for many years he has done the end-to-side anastomosis described above, with very much more satisfactory results. Others, as Hirschman, of Detroit, still prefer the side-to-side anastomosis, holding that it has no disadvantage provided the opening is made large enough.

The successive steps of the ileo-colostomy operation are shown in figs. 24, 25, 26, 27, 28, 29, 30, and 31.

About 5 per cent of the cases which were short-circuited in Lane's earlier experiences subsequently returned for colectomy. More recently he claims to be able to tell fairly accurately whether colectomy is required in the first place. If the splenic and hepatic flexures are very low down and if the transverse colon hangs way down to the pelvis, colectomy is indicated, in his judgment.

Many methods have been devised for dealing with the end-group cases in the effort to combat the condition without resort to colectomy. Rovsing, Eve, Duret, Reed, Coffey, Mayo, and others have devised or have practiced methods of dealing with the visceroptosis, with redundancy in certain portions of the gut, or with the condition of stasis as an entirety as the result of interference with drainage in a given portion or portions of the canal, particularly in the cecum and colon. It is not within the province of this communication to discuss the merits or demerits of these or to give the details of technic employed. It may be said that no method yet suggested is ideal. All are yet in the stage of evolution of the entire subject, which calls for additional experience. Some of the suggestions appeal to us as more or less illogical surgically, others as meeting certain requirements. Taking the subject as a whole and considering the majority of the end-group cases, the method as practiced by Lane seems more nearly to meet all demands than any other method proposed.

Partial colectomy is employed by some operators, and is still in the developmental stage in its application to chronic intestinal stasis. It may consist in ileo-colostomy (ileum to transverse colon), with removal of the ascending and part of the transverse colon, and cecum. Lane, years ago, tried and discarded the procedure, strongly urging its inadequacy, as a rule, in cases of stasis demanding removal of the bowel.

Technic of colectomy.—An incision of the same kind but a little longer than the one employed for ileo-colostomy alone is made when colectomy is to be performed. The importance of making a free incision is to be emphasized. It is essential that a full view of the abdominal cavity be obtainable.

Ileo-colostomy (according to the technic just described) having been performed on a previous occasion, or as a preliminary step of the present operation, the large bowel is now separated one and a half to two inches above the ileo-colic junction. This is accomplished, as in the case of the ileum, by grasping the bowel between two forceps and dividing between with the cautery. The meso-colon from the cecum on is tied off in sections (fig. 32) and the large bowel thus exsected is removed from the abdominal cavity. The cut end of the pelvic colon is closed with a running suture, and is buried, about on a

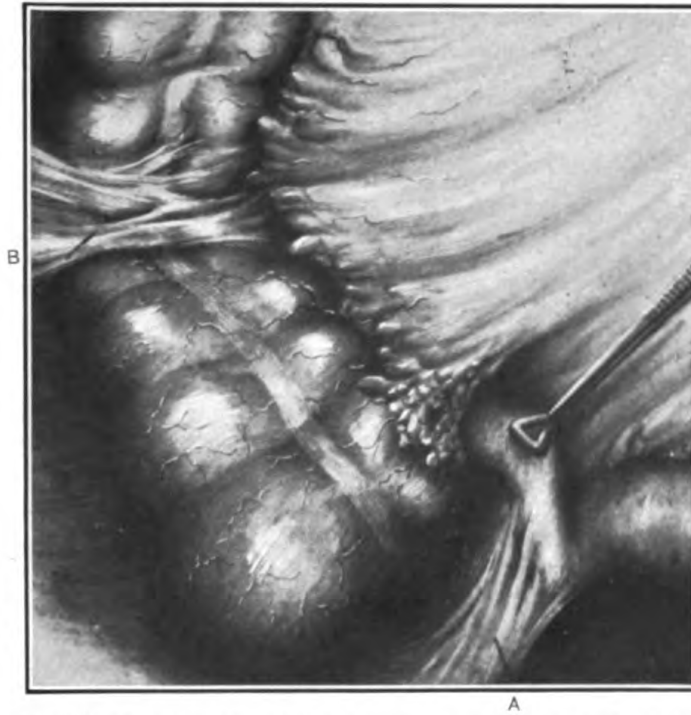


Fig. 17.—A, ileo-pelvic band; B, band constricting ascending colon.

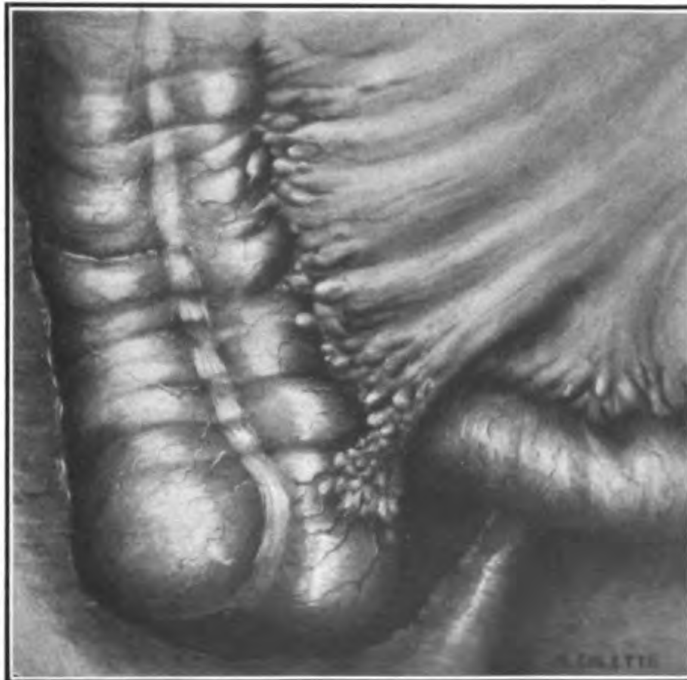


Fig. 17a.—Conditions in Fig. 17 corrected by transverse division of ileo-pelvic band and longitudinal suture. Division and suture of band over ascending colon. Fixation of cecum.

Bainbridge—Intestinal Stasis.

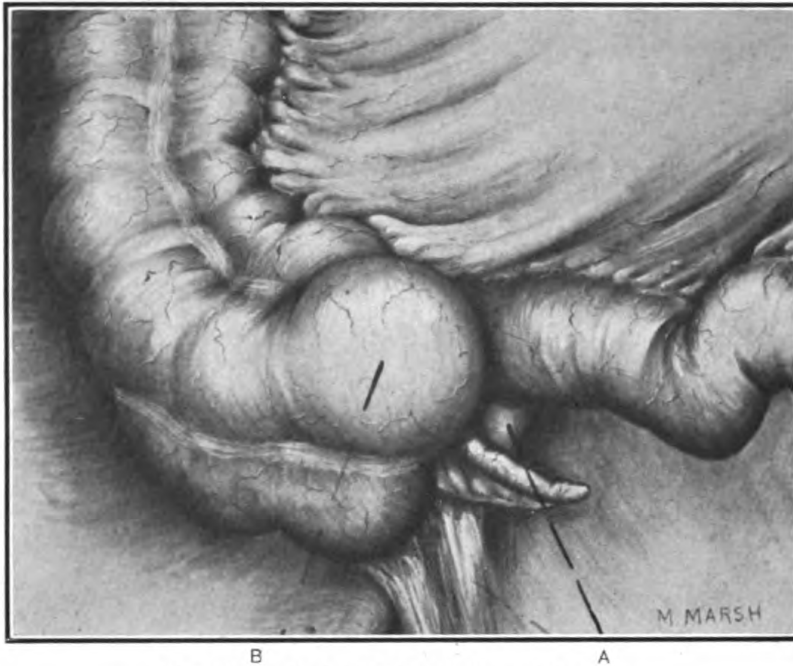


Fig. 18.—A, ileo-pelvic band; B, mobile cecum.

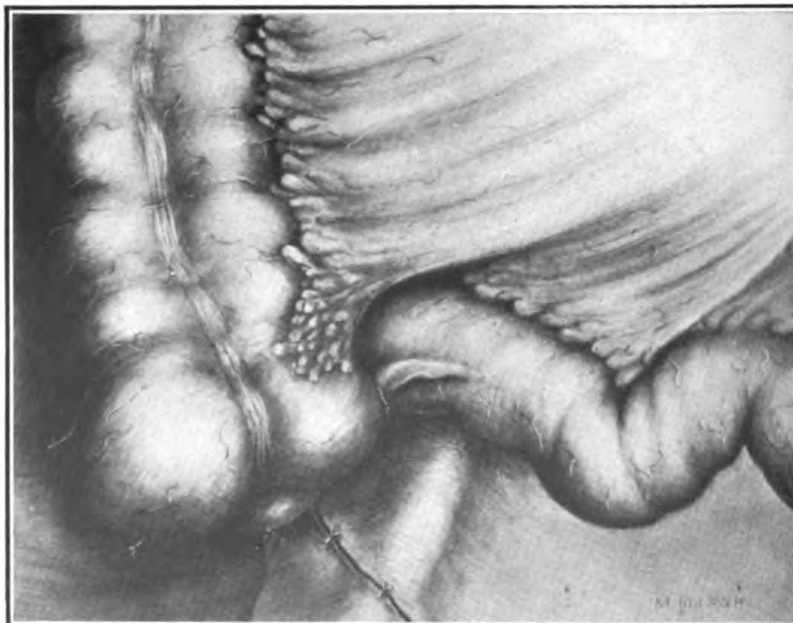


Fig. 18a.—Same after operation.

Bainbridge—Intestinal Stasis.

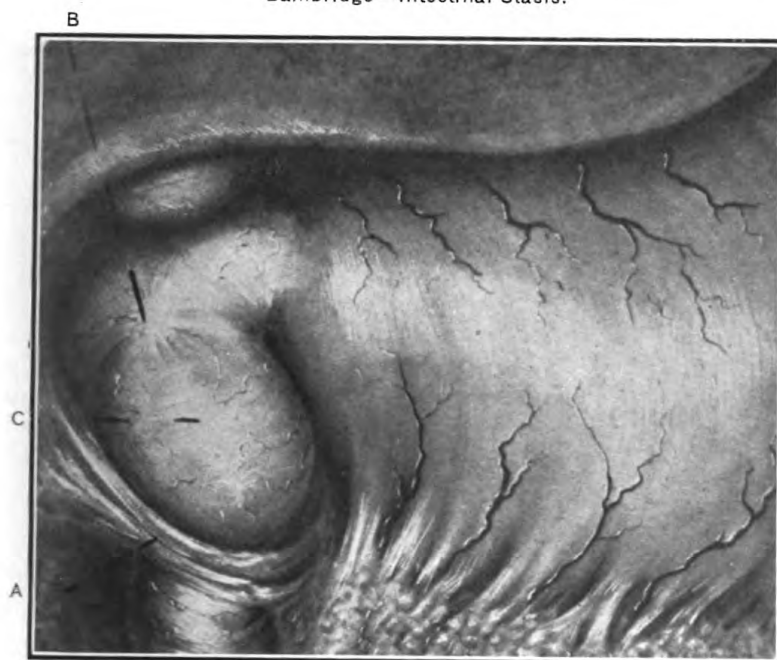


Fig. 18b.—A, band over duodenum constricting it; B, pyloric ulcer, with obstruction; C, dilated duodenum.

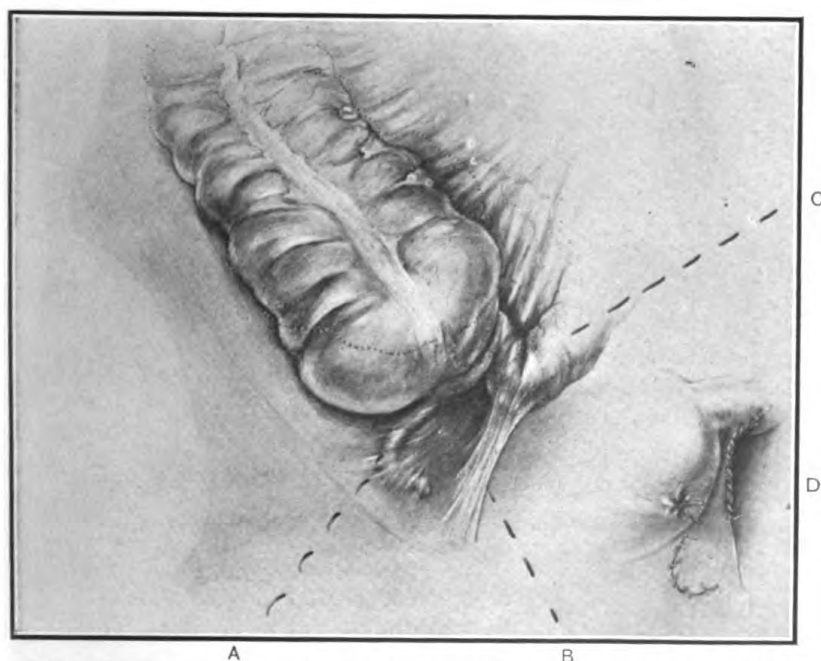


Fig. 18c.—A, appendix with adhesions; B, ileo-pelvic band; C, dilated ileum; D, condition corrected.

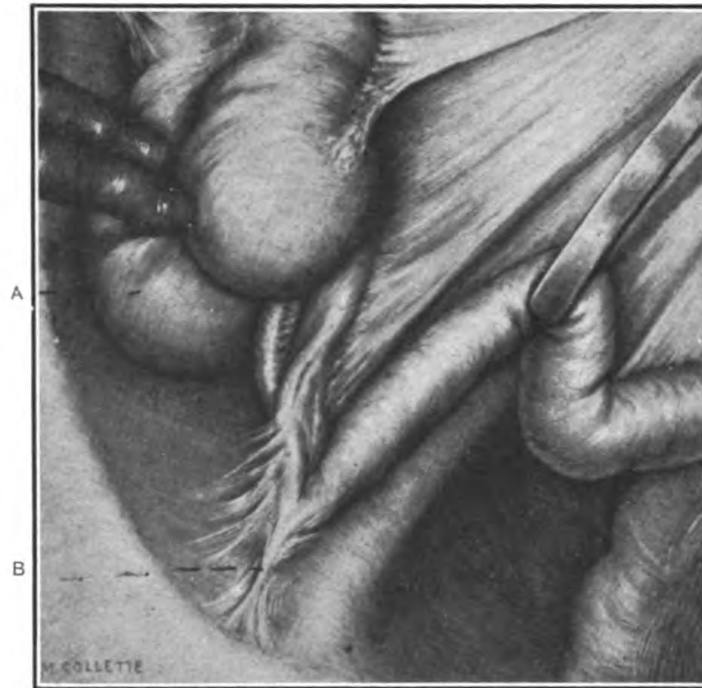


Fig. 19.—Conditions found at operation; A, much enlarged, mobile cecum; B, ileal kink.



Fig. 19a.—A, band severed transversely, leaving raw surface to be covered; kink relieved.

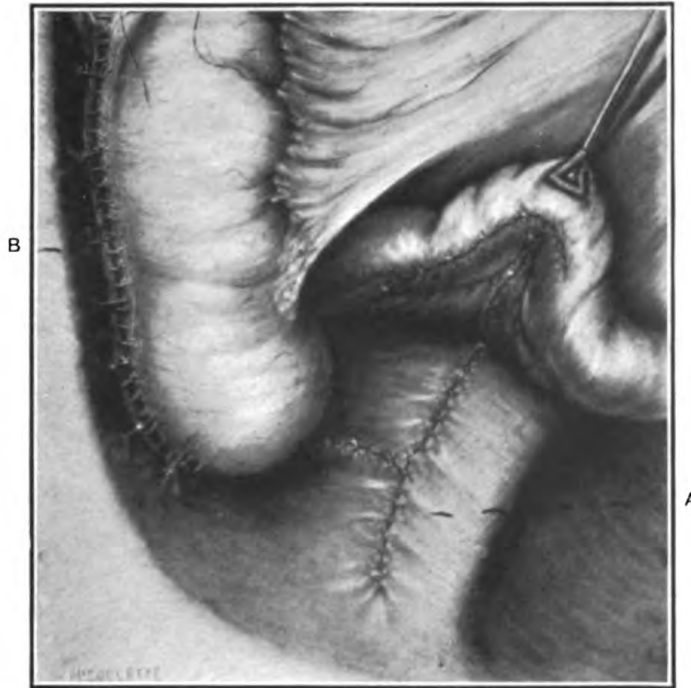


Fig. 19b.—A, raw surfaces covered with flaps of peritoneum by interrupted stitches; B, cecum, ascending colon plicated and fixed to abdominal wall.

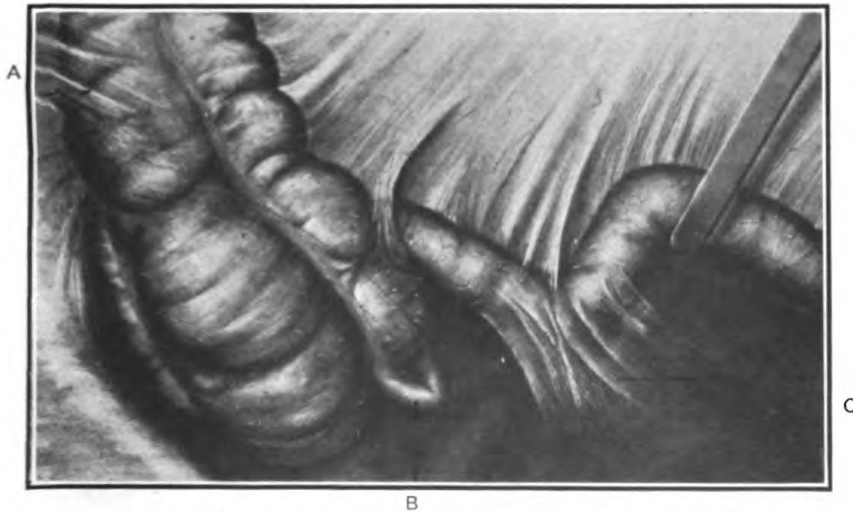


Fig. 20.—(From British Medical Journal, Nov. 1, 1913) A, pericolic membrane ("Jackson's membrane"); B, appendix kinked behind cecum; C, ileo-pelvic band.



Fig. 20a.—Conditions in Fig. 20 corrected. A, appendix removed; B, piece of detached omentum covering area of band severed; impossible to cover by suturing.

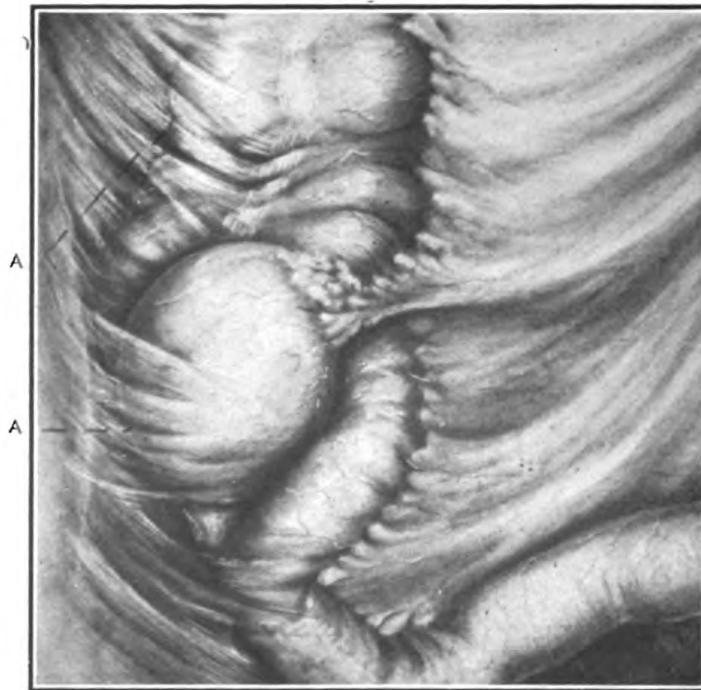


Fig. 21.—A, inflammatory adhesions following appendiceal abscess; twisting of cecum and obstruction of ileum.



Fig. 21a.—Conditions in Fig. 21 corrected. Raw surfaces covered by omental flap still connected with omentum.

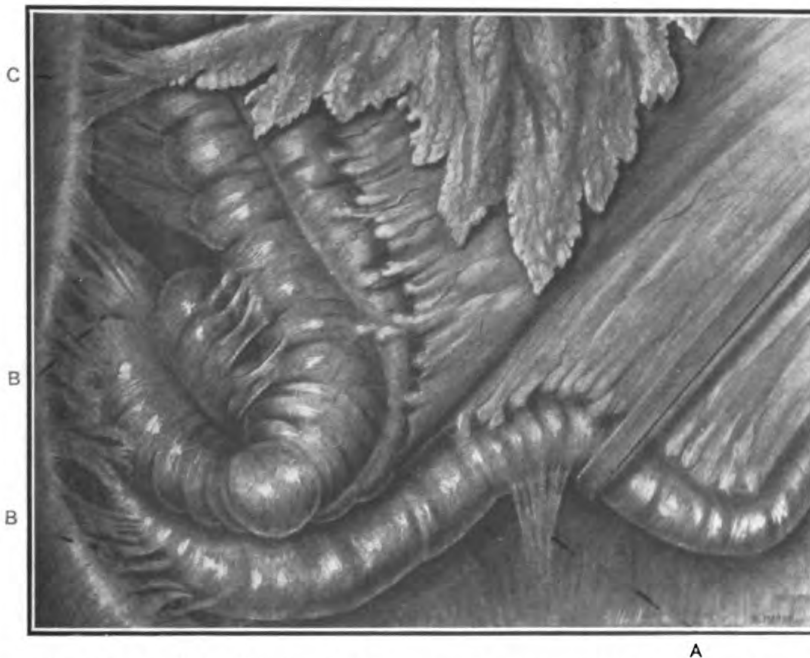


Fig. 22.—A, ileo-pelvic band; B, many adhesions around cecum and ascending colon from appendicitis, with operation; C, adherent omentum; ileum totally obstructed with patient in upright position; no bismuth passing through ileum to large intestine.

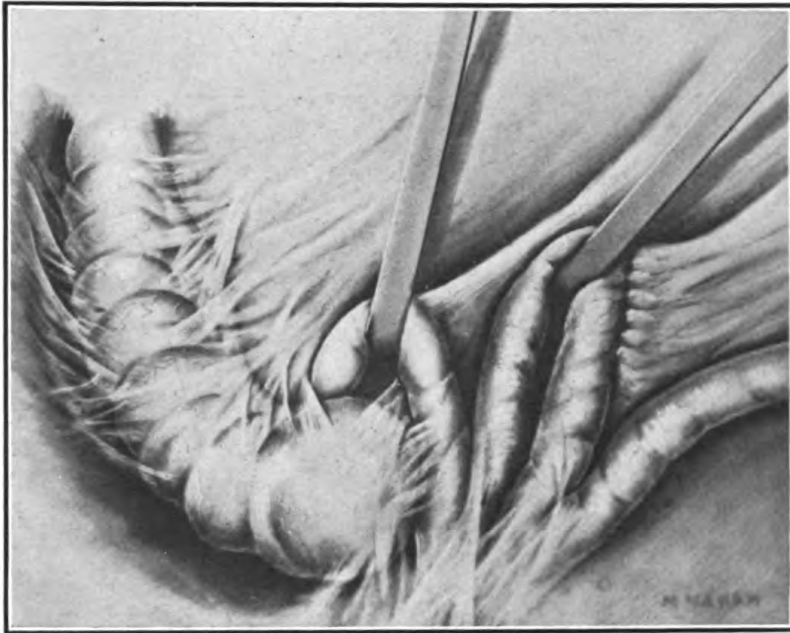


Fig. 22a.—Same patient, showing condition one year later. Adhesions had re-formed, despite placing bowel in better position at previous operation.

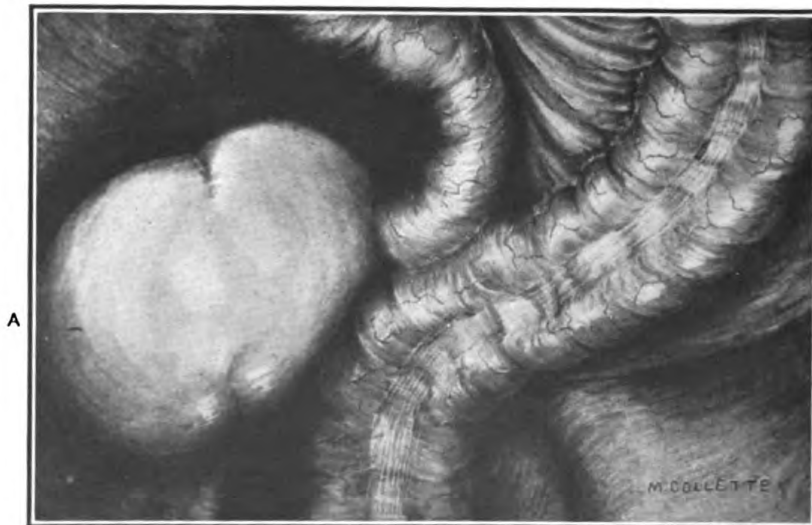


Fig. 23.—Diverticulum, A, developing after ileocolostomy. Lane's case.



Fig. 24.—Incision to one side of middle line, dividing both layers of sheath of rectus, from two inches or more from umbilicus to symphysis pubis. Abdominal wall covered with sterile gauze; clamps in place.

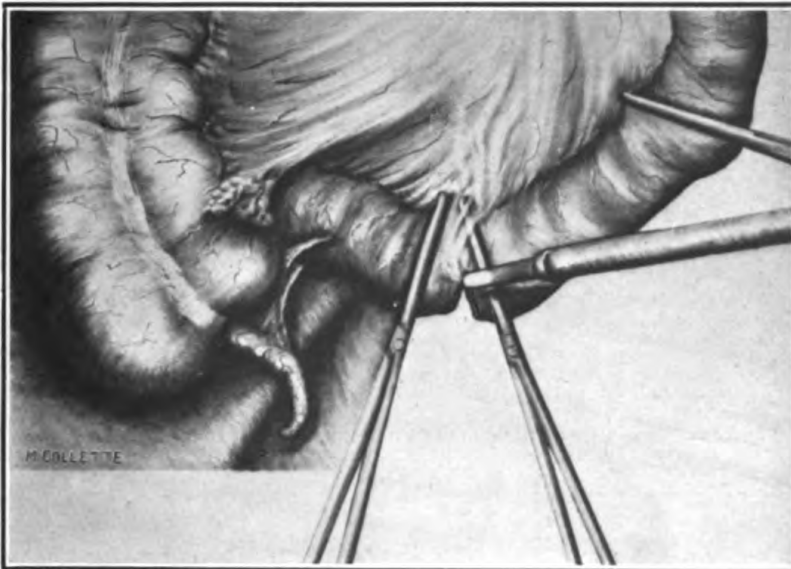


Fig. 25.—Severance of terminal ileum by the cautery; clamps in position.

Bainbridge—Intestinal Stasis.

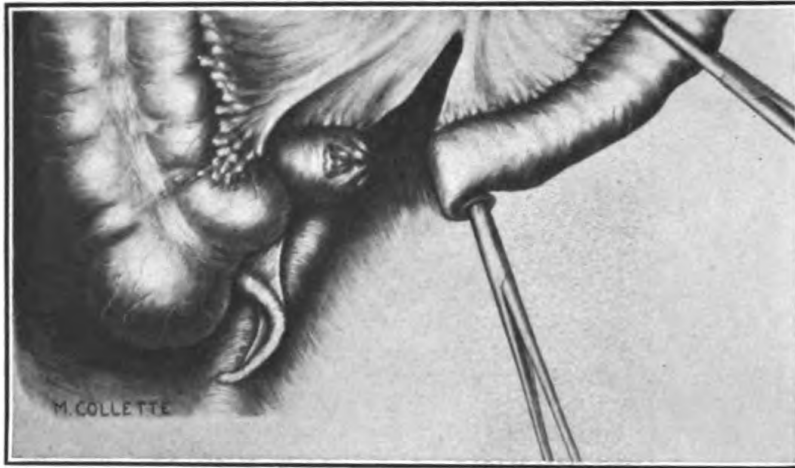


Fig. 26.—Terminal ileum severed. Distal end tied off and turned in; proximal end rolled and held in clamps.

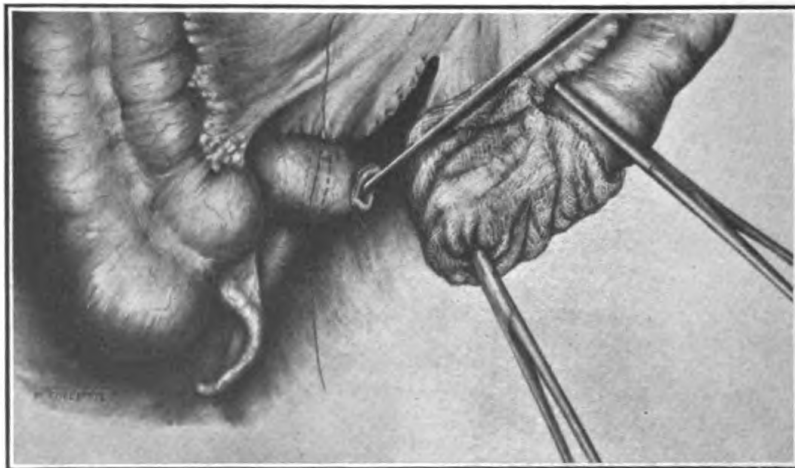


Fig. 27.—Purse-string stitch around terminal ileum, ready for inverting the stump.

Bainbridge—Intestinal Stasis.

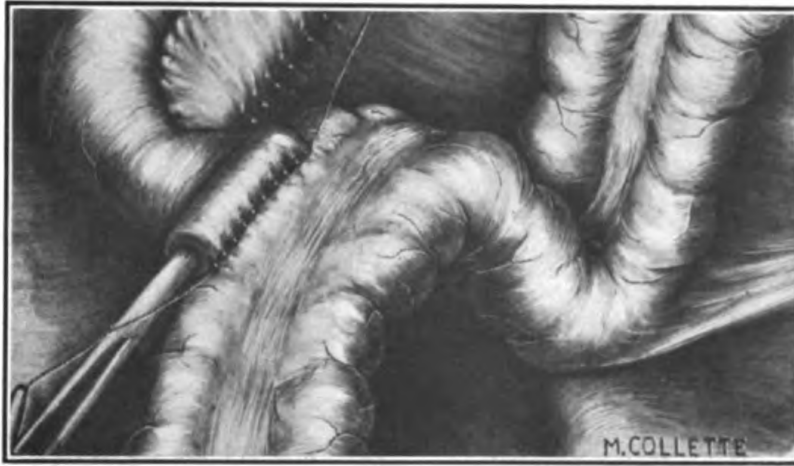


Fig. 28.—First line of sutures being inserted.



Fig. 29.—Opening made in pelvic colon below last kink; aperture of severed ileum held open by clamps; through-and-through sutures being inserted.

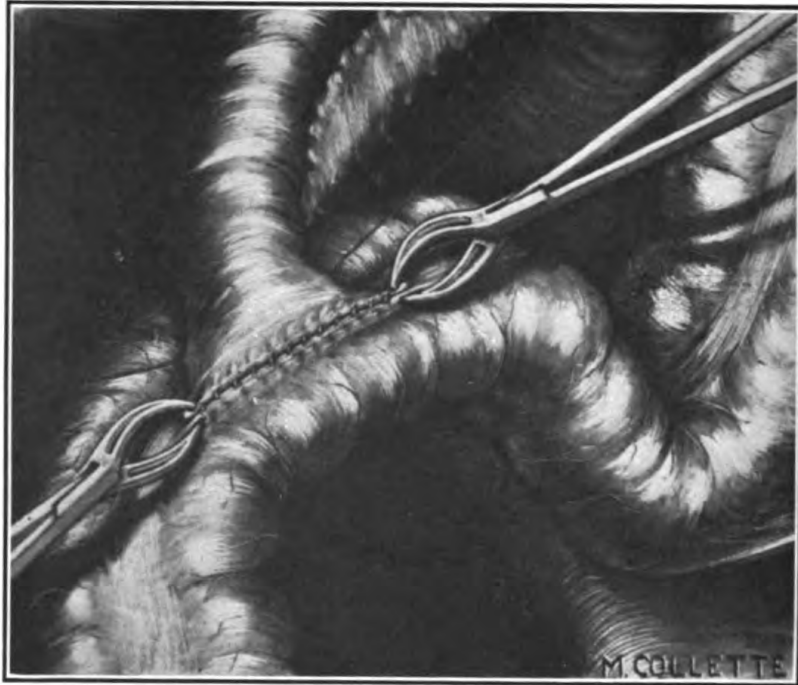


Fig. 30.—Superficial Lembert stitches being inserted.

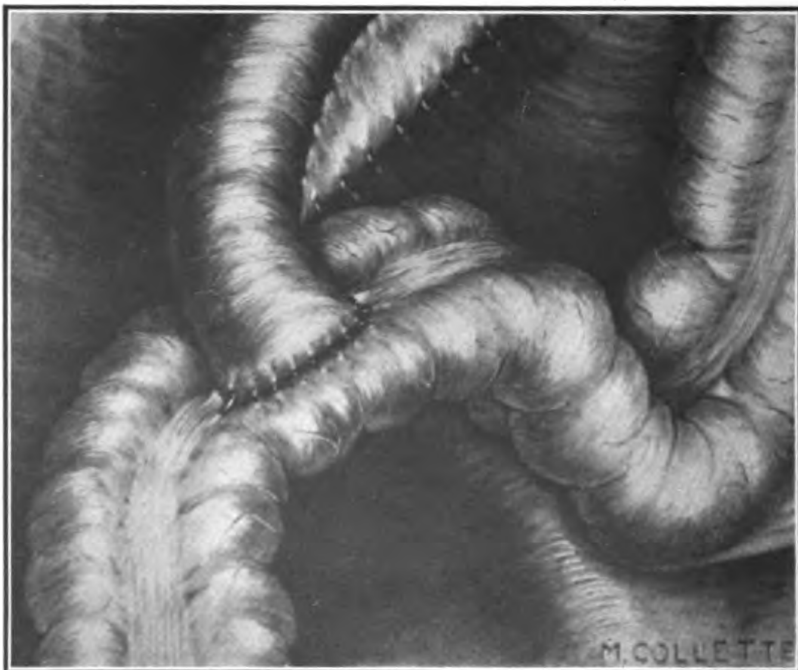


Fig. 31.—Anastomosis completed. Dead space in pelvis closed by stitches A.

Bainbridge—Intestinal Stasis.

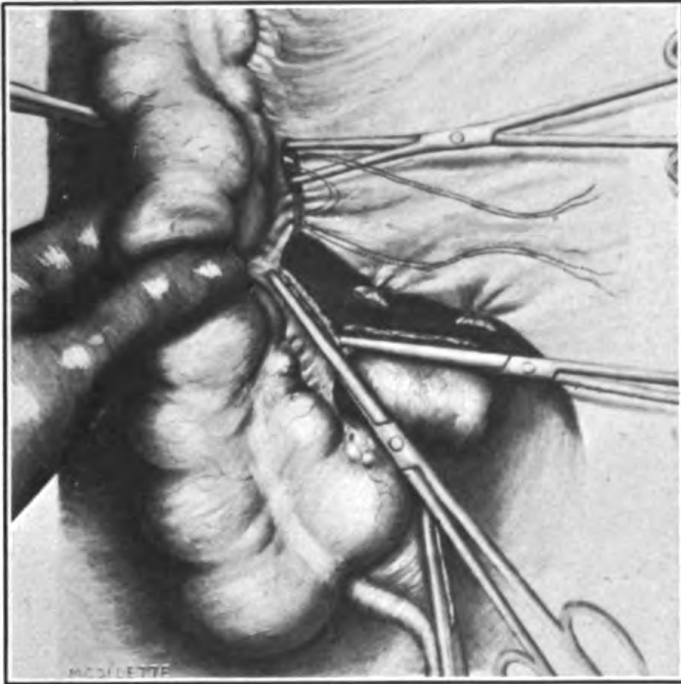


Fig. 32.—Putting in ligatures, ligating ascending mesocolon and meso-
cecum with double layer of strong black linen.

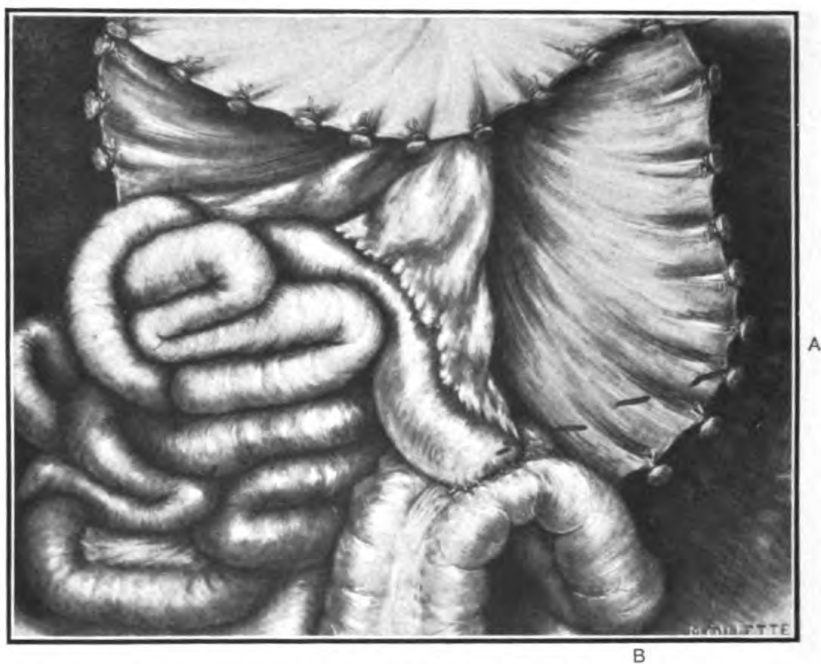


Fig. 33.—Anastomosis completed, whole gut removed down to last kink.
A, Anastomosis (end-to-side); B, cut end of colon sutured to fascia of pelvic wall.



Fig. 34.—Rubber drainage tube in place.

level with the upper limit of the ileo-colostomy, by means of an encircling suture which includes the peritoneal and muscular coats. In order to prevent subsequent sacculation, the cut end of the colon may be closed and sutured to fascia of pelvic wall, as shown in fig. 33. The esophageal tube is passed in the same manner as in ileo-colostomy (fig. 34), and the after-care of the patient is the same.

Lane, in a recent personal communication, says he now thinks it better to do an end-to-end anastomosis in the colectomy operation, where ileo-colostomy and colectomy are performed at the same time.

While these surgical procedures, and the various methods of intervention which have been proposed, may not be ideal, the condition of chronic intestinal stasis, as we now understand its far-reaching import, certainly calls for radical intervention in some cases, and the methods described seem to be the best suggested up to the present moment. With continued study of these cases and their treatment, undoubtedly the ideal method will be evolved. Furthermore, many other knotty problems in medicine and surgery may be cleared up through the study of chronic intestinal stasis. We are not all in accord with all of Lane's views concerning the association of other diseases with chronic intestinal stasis from an etiological point of view, but it can not be definitely stated, at this stage of the evolution of the entire subject, that he is either right or wrong. In my own experience some remarkable surprises have been encountered, which have pointed the way to further investigation. For example, in a number of cases of chronic intestinal stasis in subjects who are epileptic, operation for stasis has recently appeared to cause complete cessation of or marked decrease in frequency and severity of the attacks of epilepsy. It is too early yet to forecast the ultimate outcome, but there is reason to believe that in some cases of epilepsy other than of central origin, amelioration, if not cure, may be obtained by the permanent relief of chronic intestinal stasis. Melancholia, lumps in the breast, albumin and casts in urine, and other untoward conditions, have disappeared after relief of stasis.

Every imitator of a new régime, every originator of a new theory, every pioneer who blazes a new trail, is called by his compeers an extremist, a hobbyist, a faddist. So, with Sir Arbuthnot Lane, with regard to chronic intestinal stasis, the theories evolved and the treatment devised. It has been said that he has gone too far with his theories, and that his treatment, in some cases, has been inexcusably radical. Recalling, however, the fact that he has proved a brilliant explorer into other hitherto unrecognized fields, and that he has already revealed certain previously unknown and now well-established points with reference to chronic intestinal stasis, may we not safely, and with conservative care, follow his lead farther and farther, until what is controversial to-day as regards both the theo-

retical and the practical considerations in relation to the human drainage system, will be the established fact and practice of tomorrow?

SYMPOSIUM ON INTELLIGENCE TESTS.

SHEEHAN. THOMAS. JENKINS. SCHIER.

SERVICE USE OF INTELLIGENCE TESTS.

By R. SHEEHAN, Passed Assistant Surgeon, United States Navy.

Methods of testing intelligence have been in use in psychological laboratories for many years, but it is only of late that they have been applied to the practical problems presented in pedagogy and psychiatry. As a result of their widespread use in these fields it soon became apparent that they might be utilized to advantage by the military services as a means of excluding defectives.

Considerable work* has been done in the endeavor to adapt them to this purpose. Unfortunately, like most new measures, they have been accorded by enthusiasts such importance and panacea-like properties as that given early to the static and high-frequency currents, the Finsen light, the roentgen ray, radium, the association tests et al., with all of which, after the first flame of novelty went out, there was subsidence into the glow of true worth.

Due to the fact that these tests have been acclaimed by the popular press, and even by technical writers, as an exact means of judging the mental and moral mechanisms of any normal or abnormal person, they have come into wide use, and often by persons having little or no scientific knowledge. Therefore their true value has been lost sight of through uncritical exploitation and mystification.

The test which has received the most attention is the so-called "Binet-Simon scale." This was evolved as a means of measuring the development of the mind; that is, to estimate the degree of retardation. The method is an application of the idea that mental development shows distinct accretions from year to year. They first appeared in 1905,¹ and after experimentation and revision the present scale was published in 1911.² In its use if a child shows a psychological age of 12 years or more he is presumably normal. The tests give an estimate of the capacity of the mind for acquiring simple knowledge at various degrees of maturity. However, it must be

* King, Edgar, captain, M. C., U. S. Army, Government Hospital for the Insane, Washington, D. C., and Fort Leavenworth, Kans., 1914.

Schier, A. R., acting assistant surgeon, U. S. Navy, U. S. M. C. recruiting station, St. Paul, Minn.

Jenkins, H. E., passed assistant surgeon, U. S. Navy, naval disciplinary barracks, Port Royal, S. C., 1914.

Thomas, G. E., passed assistant surgeon, U. S. Navy, naval prison, Portsmouth, N. H., 1914.

McMullin, J. J. A., passed assistant surgeon, U. S. Navy, recruiting station, Buffalo, N. Y., 1914.

Mann, W. L., jr., passed assistant surgeon, U. S. Navy, naval disciplinary barracks, Port Royal, S. C., 1912.

realized that for our purposes they have limitations and imperfections. Stuart³ states that "there is a likelihood of wide discrepancies in the use of these tests when made by different observers. They should not be considered an instrument of precision and will probably never become exact," and Healy⁴ in his very late work says: "In considering the scientific exactness of results we must remember that there are many delicate possibilities of variation ever present. These may occur through the many varying conditions of the investigator, the one investigated, and the medium of investigation."

In the use of the tests it has been noted that even with skilled workers great variance is noted in results, so that with untrained examiners they are almost valueless. The observer should have some knowledge of psychology. He should be familiar with their technique and intent before attempting to apply them, and, even better, attend a psychologic laboratory where they are in constant use. Besides, he should make much self-conscious preparation to avoid all possible interference with the accurate determination of facts. His qualities and attitude are most important. There is great necessity for the examiner to observe his own personality, and success or failure will depend upon this ability or inability to get in touch with the individual. Goddard⁵ says: "The attitude of the examiner is all important." Healy⁴ also states: "It is very clear that judgment by means of tests as to the possible existence of those abnormal states which constitute insanity is often a matter for those with a highly technical training and experience."

It should be comprehended that these tests are only indicative and of value when estimated with other considerations. There is likelihood that many facts may be left out of consideration that are necessary in estimating the individual. "The Binet scale may not reveal what might be of importance to know,"⁴ "and these formal tests merely point to special abilities or disabilities which may need further investigation."⁶ "The Binet system, with its rather cut-and-dried standards, is useful mainly as an exploratory procedure." Binet himself never intended to measure with the scale general ability apart from schooling. In their application and the interpretation of results much shrewd common sense must be used. As Healy states:⁶ "No test should be undertaken until the subject is perfectly clear as to what is required of him. If the scale is used in the light of the other influential evidence it is valuable, and the principle is a good one and well worth the effort of adaptation to our use."

The high-grade defectives, who really are the only ones that seriously come to our attention, evidently need other methods.

There is little doubt that the best criterion of the adaptability of a candidate for enlistment would be a cross section of his career. However, when he presents himself he is governed by the desire to enter

dementia precox and, as is well known, these patients oftentimes are in childhood especially bright in school and readily acquire the knowledge required by these tests. Since April 1, 1914, careful examination of the Navy admissions have only detected three patients that were feeble-minded, and in only one of these was this the likely cause of the episode that led to his admission.

In the use of these tests without considerable latitude it is still questionable whether some potentially good men might not be excluded. It has been found that some of the higher scale questions were too difficult for high-school pupils, and even highly trained normal individuals have failed on them.

It has been found that only one boy of a class in first year high school got all the tests. It would seem that the tests are still so special in their application that it would not be safe to say that one who does not pass them did not have the mentality of at least 18 years. They have not been perfected so that they will bring out the defects of persons beyond 12 years of age, and thus show how much responsibility these people can bear and what can be expected of them. Also they are still too much a test of formal education to be useful in our work as a routine measure.

There is no question as to the desirability of excluding the moron from the service, but are we justified, in taking say, 25 minutes of the recruiting medical officer's time, of which it seems to be agreed he has none too much, to use a measure which, so far at least, only detects what really are only a small part of our undesirables? May we not be going to the extreme and by paying so much attention to this phase of the examination be compelled to limit the remainder and thus pass over equally important physical considerations? Can not this mental examination be done better by having a period of probation at the training station during which the men can be kept under continuous observation and not only be subjected to the mental test, which is finally agreed upon as the proper one for our use, but further be subjected to the test of showing their reactions to their environment? Here there would also be the advantage of having these observations made by medical officers who by the fact of doing this duty could become skilled in the work, thus assuring accurate results, and also obviating the possibility of depriving the service of good men. As Healy⁴ says "to assure good results the surroundings and examiner must elicit on the part of the subject attention, interest, freshness, and understanding and secure him from distractions and fatigue." Surely these are not the conditions obtainable in the ordinary recruiting office. Further, "more than one sitting is usually necessary, except for testing the clearly feeble-minded."⁴

It is said that the most serious objection to the time limit comes from the fact that it makes the whole test a stereotyped, rigid,

mathematical procedure, which, in the last analysis, reduces the whole method to an absurdity. Wide time limits must be allowed before discrimination for or against the performer. As a basis of all tests a study of the intellectual equipment is indicated so that when fully carried out they involve a large amount of time, and mean an almost entirely specialized piece of work. In their final evaluation the varying qualities of the individual must be considered, such as comprehension, response to stimulation, attitude, willingness, and sullenness, all of which observations require more time and opportunity than is allowed at recruiting offices.

Another point not to be forgotten is the difficulty in devising tests suitable to our purpose, when we have to apply to what is really a cosmopolitan class a measure originally designed for use with a homogeneous people.

To date it has not been found that any set of mental tests exists which is at all adequate to estimate the capabilities, and these are what we wish to estimate. The modification suggested by Dr. Schier¹⁴ seems to be a move in the right direction, and perhaps with standardization may be useful as a routine measure at the training stations. It should be applied to at least five hundred sailors and marines, selecting those who by their actual acts have proven not only that they are intellectually capable, but that they are of sufficient emotional stability to adjust themselves to all conditions of service life. For our purpose these would constitute normal men. Then compare the results of a similar examination of men who have shown by their actual acts that they are incapable of doing their duty or adapting themselves to these conditions. It is clear that if we are to obtain an effectual set of tests, it will only be by a continuation of work like that carried out by some of the medical officers quoted.

Goddard¹² has said that "very few people who are mentally defective are ever able to learn to read and write," so that while the service is not pressed for recruits, a literacy test, aside from any formal tests, should enable us to exclude with a fair margin of safety those whom such tests would detect. McMullin¹⁵ has well concluded that "a study of the mental condition of recruits, carried on for several months at the training stations by medical officers experienced in this line of work, should supplement any test which seems adaptable to recruiting stations." "The method can not be a true auxiliary to psychology unless criticism, too frequently neglected, is accorded the rôle which it deserves."

It might be of value to consider requiring a candidate for enlistment to bring with him some evidence that would enable the recruiting officer to judge his history better. This would approximate what some foreign services obtain by their perfected statistics and records.

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THE VALUE OF THE MENTAL TEST AND ITS RELATION TO THE SERVICE.

By G. E. THOMAS, Passed Assistant Surgeon, United States Navy.

Although for years our knowledge of gross mental abnormalities has been more or less defined, it is only within the last decade that the value of the mental defective and mildly incompetent, in their relation to the industrial and social problems has been definitely evaluated. The reason for this is a complex one. The speeding up of modern living and its dependence upon involved and advanced processes has brought into prominence the individual who has mentally failed to keep abreast of this advancement. In this age of specialization, highly involved machines require highly intelligent handling. Under former conditions of simple living, the defective mind never became prominent unless the defect was a very gross one. In this period of accomplishment even the moderately defective are thrust into relief, and of late this type has been studied because of its important influence on social and industrial conditions.

Various methods have been devised for the measure of defective minds, and in the application of these measures not only has it been discovered that mental and moral delinquency are closely associated, but that the industrial delinquent is, in the majority of cases, a defective. The Navy is probably the most highly specialized and

intricate machine of our protective arm, and much more so than the Army. Both services have their specialties, and to operate these properly it requires special intelligence. Although the coal passer need not be as intelligent as the machinist mate or the electrician, nor the private of infantry need the mental equipment of the artillerist, it is reasonable to expect a definite minimum mentality which will exclude the bulk of those who through mental incompetence are likely to bring injury to the service. The work that has been done in the past two years makes the realization of this desire a most probable one.

Tests have been devised by de Sanctis, Binet-Simon, Yerkes, Bridges, and others, with the view of determining the mental measure of individuals, and primarily to fix the normal mental growth for children. The Binet measure of intelligence, which was published about seven years ago, and has been widely applied in this country and abroad, according to most authorities has proved to be a reasonably accurate measure of the intelligence of the child.

This test is the selected result of work with normal and abnormal children over a period of 20 years and consists of 55 procedures. The point scale,¹ a system devised by Yerkes and Bridges, and employed in the Psychopathic Hospital at Boston, is designed to take the place of the Binet scale, and it is believed by its authors to be a more accurate index of the mental capacity of individuals than the Binet method. Much diversity of opinion exists as to the proper tests for adults. White and Jelliffe² are of the opinion that it requires much study and considerable skill to use the Binet system with sufficient accuracy to make it of diagnostic value, and according to their experience the groups for adults have not proved accurate enough to be valuable. Prof. Yerkes declares that the tests for ages over ten are too difficult. It is not necessary, according to Kuhlmann and Goddard,³ that this test be applied by trained psychologists; Yerkes and Bridges, on the other hand, believe that the "Binet scale has been used in markedly different ways, as well as with minor differences in procedures; that this scale is so variously used, misused, and abused that its results are only roughly comparable." Although there seems to be some difference of opinion as to its value when applied to children, most authors seem to agree that it is full of error when applied to adults.

For the last year and a half much work has been done at the Portsmouth naval prison with the Binet scale for the purpose of determining the mental standard of prisoners. When comparisons were made after several hundred tests had been completed, the idea of the value of this scale in its application to recruiting was advanced. There has been much discussion by psychologists outside the Navy and by some of the medical officers in the service, of the value of the Binet system as a means to determine the mentality of the recruit.

Kuhlmann ⁴ has suggested it as being valuable in this relation. Acting Asst. Surg. Schier ⁵ has devised a test using some of the Binet procedures. Passed Asst. Surg. McMullin ⁶ also has been experimenting with a simple system in connection with recruiting. If a mental test is to be applied in the Navy it should be devised for the recruiting officer and it should answer the following requirements:

1. It should be fair in its requirements, and a definite minimum passing mark established.
2. It should be sufficiently varied to make evident the intelligence, education, and training.
3. It should be so devised that but slight, if any, variations are possible in the results of the different examiners.
4. It should not consume much time.

Much care has been exercised in applying the mental tests to determine how closely they fit the above requirements.

THE BINET-SIMON SYSTEM.

From the records on file, the classification of the 300 prisoners by the Binet method is as follows:

TABLE 1.

Mental age.	Cases.	Per cent.
9.....	5	1.66
10.....	20	6.67
11.....	35	11.67
12.....	95	31.67
13 (adult)	145	48.33
	300	100.00

TABLE 2.

(A) CONVICTED OF SODOMY AND SCANDALOUS CONDUCT.

Mental age.	Cases.	Average years in school.	Alcoholic.	Abnormal family history.
10.....	1	5½	70	{ Tuberculosis, 4. Alcoholic, 3. Epilepsy, 2. Insane, 1.
11.....	3			
12.....	2			
13.....	4			

(B) CONVICTED OF THEFT.

9.....	1	7	30	20 per cent alcoholic.
10.....	1			
12.....	2			
13.....	6			

(C) MEN WHO HAVE LOST ALL GOOD TIME BECAUSE OF MISCONDUCT.

10.....	1	5	66	{ Feeble-minded, 1. Tuberculosis, 2. Epilepsy, 1.
12.....	4			
13.....				

TABLE 2—Continued.

(D) SYPHILITICS.

10.....	1	}	7	66.8	25 per cent alcoholic.
11.....	2				
12.....	5				
13.....	4				

(E) GENERAL COURT-MARTIAL PRISONERS SELECTED ON ACCOUNT OF SPECIAL ABILITY.

13.....	10	9	60	{Feeble-minded, 1. Alcoholic, 2.
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(F) THREE SERGEANTS, FOUR CORPORALS, AND THREE PRIVATES OF THE MARINE GUARD, SELECTED AS ABOVE THE AVERAGE IN EFFICIENCY.

Mental age.	Cases.	Average years in school.
11.....	2	} 7½
12.....	4	
13.....	4	

(G) TEN COMMISSIONED OFFICERS IN THE NAVY YARD (2 MARINE CORPS, 3 MEDICAL CORPS, 1 NAVAL CONSTRUCTOR, 4 OF THE LINE).

All passed successfully the adult test; but two answered correctly all the questions; eight failed on the same question (13 No.1). All of these men are above the average in mental development and training, but their failures as above noted are not surprising, as in most cases snap judgment and faulty observation were responsible.

It will be seen in Table 1, that the percentage of cases that show a mental age less than the adult test, which is 13, is about 52 per cent. Of this number, however, over 31 per cent are classified in the 12-year grade. The 31 per cent classified in the 12-year grade and the 11 per cent classified in the 11-year grade, are to be considered as mental incompetents, and the 6.67 per cent in the 10-year grade and the 1.66 per cent in the 9-year grade are positive mental defectives. Reclassified the grouping would be as follows—145 cases, or 48.33 per cent, are normal individuals; 130 cases, or 43.34 per cent, are mental incompetents; 25 cases, or 8.33 per cent, are positive mental defectives.

According to the scale tentatively adopted in 1910, by the American Association for the Study of the Feeble-Minded, 51.67 per cent of the 300 prisoners examined at this institution are defective. It is to be expected that prisoners, as a whole, are less intelligent than those in the regular service who have not been convicted by general court-martial, and for purposes of comparison a group of marines was selected consisting of men above the average in the guard and who perform the most responsible work in the garrison. In this group (2f) it is to be seen that the average mentality of these men is below that of the 300 prisoners. One marine given this examination

TABLE 3.—*Prisoners.*

Number.	Schier.	Average years of schooling.	Average time.
	<i>Per cent.</i>		<i>Minutes.</i>
9	100	9.8	16.1
24	90	6.2	14.6
26	80	5.5	12.9
13	70	5.6	13.5
10	60	5.2	16.9
8	50	6.1	10.2
5	40	4.5	15.0
4	30	4.5	14.2
1	20	5.0	25.0
100			15.3

TABLE 4.—*Marines.*

Number.	Schier.	Average years of schooling.	Average time.
	<i>Per cent.</i>		<i>Minutes.</i>
25	100	9.56	8.64
33	90	6.33	11.66
17	80	4.47	12.52
13	70	6.08	13.69
8	60	3.75	15.00
3	50	4.00	16.00
1	30	8.00	18.00
100			13.6

The percentage of marines who failed to pass 70 per cent was 12.

The percentage of prisoners who failed to pass 70 per cent was 28.

In order to learn the relation of efficiency to the mental measure, as is made according to the Schier test, the military efficiency of the group of one hundred marines was passed upon by nine sergeants and one commissioned officer. They were marked on a basis of five, and it is believed that the final average of these men represents as nearly as possible the real military efficiency of the individual. In Table 5 is shown the average efficiency of each group, according to their marks, and the relative harmony of this comparison is somewhat startling.

TABLE 5.

Number.	Schier.	Average efficiency.
	<i>Per cent.</i>	<i>0-5</i>
25	100	4.44
33	90	4
17	80	4.21
13	70	3.83
8	60	2.7
3	50	3.1
1	30	2

The records of those who failed to pass 70 per cent, both prisoners and marines, and whom we may tentatively consider to be defective, is given in detail.

TABLE 6.—*Marines with less than 70 per cent Schier.*

No.	Name.	Rate.	Service.	Efficiency.	Schier.	Time.
			Years.	0-5	Per cent.	Minutes.
1	L.....	Corporal..	9	4.5	60	20
2	A.....	Private...	3	3.0	50	10
3	B.....	do.....	2	3.5	50	23
4	E.....	do.....	3	3.0	50	15
5	G.....	do.....	6	3.0	60	16
6	L.....	do.....	3	2.0	60	10
7	N.....	do.....	3	3.0	60	11
8	S.....	do.....	8	2.5	60	14
9	W.....	do.....	4	3.5	60	21
10	W.....	do.....	2	3.0	60	15
11	M.....	do.....	6	2.0	30	18
12	I.....	Sergeant..	3	.....	60	13

TABLE 7.—*Prisoners with less than 70 per cent Schier.*

No.	Name.	Offence.	Conduct.	Education.	Schier.	Time.
				Years.	Per cent.	Minutes.
1	K.....	Conduct prejudicial to good order and discipline.	First.....	4	30	25
2	M.....	Theft.....	do.....	5	50	.....
3	M.....	do.....	do.....	2	60	22
4	N.....	do.....	Second.....	4	50	12
5	R.....	Scandalous conduct; resisting arrest.	First.....	4	30	.....
6	R.....	Desertion (2 specifications).	Second.....	8	60	20
7	M.....	Scandalous conduct.	First.....	2	50	.....
8	P.....	Sodomy.....	do.....	5	30	11
9	G.....	Fraud.....	Second.....	5	30	10
10	N.....	Theft.....	First.....	6	50	9
11	B.....	Scandalous conduct, assault, and striking another person in service.	do.....	5	40	20
12	B.....	Desertion.....	do.....	5	60	23
13	B.....	Desertion and fraud (2 specifications).	Second.....	1	40	.....
14	B.....	Desertion and fraud.	do.....	2	40	14
15	B.....	Theft.....	Fourth.....	6	60	24
16	C.....	Desertion.....	First.....	8	50	13
17	C.....	do.....	do.....	8	60	7
18	C.....	do.....	do.....	1	60	9
19	C.....	Desertion and fraud.	do.....	6	50	8
20	H.....	Assault and desertion.	Second.....	8	50	11
21	D.....	Desertion.....	do.....	8	40	15
22	F.....	Theft.....	First.....	10	50	8
23	F.....	Desertion.....	do.....	5	60	10
24	G.....	Fraud.....	do.....	5	60	11
25	G.....	Theft and opening mail.	do.....	6	40	15
26	H.....	Fraud and desertion.	do.....	3	60	9
27	H.....	Refusal to obey order.	do.....	5	20	25
28	J.....	Scandalous conduct.	do.....	9	60	34

In Table No. 6 but 1 man in the 12 is considered to be a valuable one. This man (No. 1) has received but a meager education, three years in the graded schools, and aside from being somewhat slow in perception he is a very valuable corporal; No. 5 is now awaiting a bad-conduct discharge; No. 6 can not be trusted in any responsible duty; No. 12, a sergeant, has just been court-martialed for culpable inefficiency in the performance of duty. Then of the 12 selected out by this test as being below the normal required by the service, over 91 per cent have, by their records, proven to be inefficient and undesirable.

Of the 88 who successfully passed 70 per cent and who are supposedly, according to the Schier measure, desirable for the service, 5 have received a mark of 3.5 or less.

TABLE 8.—*Five marines with efficiency of 3.5 or less who passed 70 per cent.*

No.	Name.	Military efficiency.	Schier.	Remarks.
1	B—.....	3.5	90	Indifferent.
2	B—.....	3.5	90	Careless.
3	C—.....	3.5	70	Undesirable.
4	G—.....	3.5	90	Careless.
5	D—.....	3.3	70	Not desirable in any way.

Of this number, three (Nos. 2, 3, and 5) are without a doubt undesirable, the other two (Nos. 1 and 4) are intelligent, but are careless and indifferent, so actually of the 88 who passed the test only 3.3 per cent are considered below the desirable military efficiency.

Of the 28 per cent in the group of prisoners who failed to pass this 70 per cent minimum, it will be noticed in Table 7 that most of these men are undergoing confinement for offences of a more or less severe character; 7 are convicted of theft, 5 of scandalous conduct, 7 fraudulent enlistment, 3 conduct prejudicial to good order and discipline, and 6 desertion. In this prison the percentage of those confined for desertion alone is 47. Among these 28 defectives the percentage convicted of desertion is 21; the other 79 per cent are convicted of criminal offences.

A COMPARISON OF THE SCHIER AND BINET SYSTEMS.

In order to show whether the Schier system or the Binet system is more accurate in evaluating the defective and for the purpose of finding the relative value of these two systems 30 men were given both tests.

TABLE 9.—*Thirty men tested by both Schier and Binet systems.*

No.	Name.	Offence or rate.	Conduct.	Education.	Schier.	Binet.
				Years.	Per cent.	Years.
1	B—.....	Desertion.....	First.....	5	60	10
2	B—.....	Scandalous conduct.....	do.....	5	40	11
3	M—.....	Desertion.....	Reds.....	7	70	12
4	M—.....	Theft.....	First.....	2	60	10
5	B—.....	Fraudulent enlistment.....	do.....	4	80	11
6	W—.....	Theft.....	Second.....	9	90	12
7	J—.....	Scandalous conduct.....	First.....	9	60	10
8	W—.....	Desertion.....	Second.....	6	90	12
9	R—.....	Sodomy.....	do.....	7	90	12
10	S—.....	Desertion.....	First.....	5	80	11
11	W—.....	do.....	Reds.....	6	80	10
12	S—.....	do.....	First.....	13	100	13
13	H—.....	do.....	Second.....	2	80	12
14	S—.....	do.....	Third.....	10	100	13
15	H—.....	do.....	First.....	1	100	13
16	F—.....	do.....	do.....	10	80	13
17	A—.....	Desertion and fraud.....	Thrd.....	5	100	13
18	D—.....	Desertion.....	First.....	9	70	12
19	H—.....	do.....	do.....	10	80	12
20	B—.....	Scandalous conduct.....	do.....	9	80	12
21	L—.....	Desertion.....	Reds.....	(¹) 3	90	12
22	K—.....	Sodomy.....	First.....	3	80	11
23	B—.....	Theft.....	Reds.....	6	60	9
24	M—.....	Desertion.....	First.....	4	80	13
25	K—.....	do.....	do.....	4	80	13
26	B—.....	Private.....	Excellent.....	3	80	11
27	G—.....	Sergeant.....	do.....	2	80	12
28	D—.....	do.....	do.....	(²)	90	12
29	L—.....	Corporal.....	do.....	2	60	11
30	B—.....	do.....	do.....	5	90	12

¹ Months.² British Army.

TABLE 10.—*Summary of 30 men tested by both Schier and Binet systems.*

No.	Passed.		(Binet) Varying ages.
	Schier.	Binet.	
	<i>Per cent.</i>	<i>Years.</i>	
4	100	13.00	.....
6	90	11.83	11-13
12	80	11.75	10-13
2	70	12.00	.....
5	60	10.00	9-11
1	40	11.00	.....

The results obtained (Table 10) by each system are fairly consistent. The most intelligent who passed the maximum "Schier" also passed the maximum "Binet," and as the average is decreased on the Schier scale it also decreases on the Binet scale until 70 per cent is reached, when some discrepancies creep in. It will be observed, however, under varying ages, that the ages varied from 10 to 13 in obtaining some of the Binet averages; that men who received 90 and 80 on the Schier scale were classified as 10, 11, or 12 on the Binet scale. With an arbitrary standard set for the Binet system it can be seen that a number of men would be rejected as below normal who according to the Schier scale would receive a good passing average. Again, the results of the Binet test will often vary according to the examiner, and men who by one examiner might receive 12 years "Binet" by another examiner might receive 11 or possibly 13. With this great possibility of error, which is emphasized by a number of authorities, it becomes evident that it would not be suitable for recruiting purposes, as the number of recruiting stations would produce examinations which in all probability would vary from a definite standard. The Schier test, on the other hand, allows little chance for variations, there being but one well-defined test with a definite minimum.

The time consumed in the application of a mental test is very important to the recruiting officer. Careful attention has been given to this matter in all of our work, and it was found that the average for 200 tested according to the Schier method was 14.4 minutes. This time includes preliminary questioning as to present and previous occupation, in addition to the test, and it is believed, if anything, it is a little too high. The most intelligent can be examined in from 10 to 12 minutes; the less intelligent take somewhat longer.

Whether 70 per cent, the minimum set by Schier, is the correct one can not be accurately determined. Schier found that the average number of tests passed by the normal was 8.78; that the feeble-minded succeeded on only 4.72, and the applicants classed as mentally unfit passed 5. The average number of tests passed by the 300 prisoners was 7.3 and for the 100 marines it was 8.4. This would indicate that the average mentality of the marine is much

higher than that of the prisoner, according to the Schier scale; but by the Binet measure the marines averaged less.

TABLE 11.—*A review of the failures in each of the 10 procedures which comprise the Schier test.*

No. of procedure.	Results.	
	Prisoners.	Marines.
1	17	16
2	31	39
3	22	1
4	25	20
5	14	10
6	5	2
7	18	6
8	14	11
9	29	5
10	69	49

In Table 11 the great difference between the answers of the marines and prisoners seems to be in tests Nos. 3, 9, and 7. The third test is the sentence building test, and it is employed to test the applicant's ability to write and to build a sentence of good sense; 1 per cent of the marines failed in this test and 22 per cent of the prisoners. Test No. 9 elicits the ability to read and to understand and deduct the meaning of what he has read; 5 per cent of the marines failed in this and 29 per cent of the prisoners. Test No. 7 is used to learn whether the examined is able to detect and explain absurd and ridiculous statements; 6 per cent of the marines failed and 18 per cent of the prisoners. From this we have reasons to believe that the marine is superior to the prisoner in constructive ideas; in his ability to correctly interpret simple statements; in his capacity to focus his attention and to detect the unreasonable and absurd.

Granting that all known methods for the measure of intelligence are not exact and that they sometimes fail to evaluate the normal and the defective, what is the test that most completely answers our purpose? As to the first requisite, on the Binet scale the inaccuracy of the groups over the 10-year grade would make the establishment of a definite minimum, which at the same time is fair in its requirements, impossible. This, coupled with the fact that much variation obtains in the results of different examiners, which would be especially true in the Navy, seems to outweigh any virtues that it may possess and would make its use as a standard of intelligence impracticable. The Schier test, on the other hand, more closely fulfills all of the qualifications requisite for use in the Navy. It is believed that it is eminently fair and that it is varied enough to determine intelligence, education, and training; that its results by different examiners vary but little, if any; that it can be applied by any intelligent person after a little training; and, lastly, that it consumes not too much time to make it objectionable.

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MENTAL DEFECTIVES AT NAVAL DISCIPLINARY BARRACKS, PORT ROYAL, S. C.

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During the past several years a great deal of medical attention has been given to feeble-mindedness and there still remain many unsolved problems. It is a subject of paramount importance and one worthy of great consideration. When we think of the increase of the above class in this country, which is growing greater every year, the time can not be far distant when it will be necessary to put into force an effective remedy which will not only check this increase, but in time abolish the condition entirely. At the present time there are more persons under treatment in the asylums and hospitals of this country for mental conditions than there are students in the colleges, universities, and professional schools. Dr. William Noyes, of Massachusetts, reports that there are 7,839 feeble-minded in that State, of whom 2,587 are in institutions; and Dr. E. E. Southard, director of the Psychopathic Hospital, Boston, says "the problem of the feeble-minded is the largest single practical problem before Massachusetts at the present day." The report of the committee of visitors of the State Charities of New York states that there are 32,000 feeble-minded persons in that State. Of these 4,900 are provided for in institutions especially designed for their care, and 4,500 in other institutions, leaving at large 22,600. The Royal Commission of Great Britain of 1904 reports 12,120 cases of amentia in that country, and a later investigation shows a great increase over the above figures. What is true regarding the number of feeble-minded in Massachusetts and New York is also true in the other States in proportion to the population. The subject is one worthy of serious reflection on account of the large increase of feeble-minded persons in this country.

A number of measures have been advocated for the elimination of feeble-mindedness in this country, among which may be enumerated the restriction of marriage, sterilization, and segregation.

The problem which this class of cases presents would not be a difficult one if the condition was not transmitted through heredity. However, the Mendelian theory has not been generally accepted. Rosenoff and Orr, after investigating a large number of mental cases in the light of the Mendelian theory, say: "Actual cases, which were not specially selected, were found to follow the various rules of theoretical expectation with quite as much exactness as could be expected, considering the numerous sources of error." It is generally conceded that a union of a mental defective with the same or a healthy strain, frequently gives rise to the same defect in the offspring. It is rather remarkable and surprising with what rapidity the mentally deficient multiply in proportion to normal individuals. An example of this class is seen in the Kallikak family as reported by Goddard, consequently it has been suggested that the problem may be solved by not allowing those suffering with amentia to marry. One of the principal objections against such a law would be the enormous increase in illegitimate children, and it would be almost impossible to regulate this unless the cases were segregated. At times feeble-mindedness may result from a perfectly healthy union of individuals in whom there has been no strain of amentia. This is due to some influence which occurred during the embryonic state of the child, and it would be impossible to control this class of marriages by law. While the restriction of the mentally defective from marriage would eliminate nearly all cases of feeble-mindedness, it is believed that the idea is rather Utopian than practical.

The removal of the reproductive glands from those with deficient mentality as a means of obliterating this condition is a subject which has called forth considerable discussion. In several States this is a law, but it has not been enforced to any extent. There are three methods of sterilization; first, the removal of the ovaries or testes; secondly, ligation of the vas deferens or fallopian tubes; and thirdly, roentgenization. All of these are efficient. Peters, of the Vineland Training School, advocates the last over the other two forms. He claims that the ovaries and testes are not only reproductive glands, but that they have also an internal secretion which is destroyed by castration and vasectomy. Also that the use of the roentgen ray does not involve any surgical procedure, causes very little destruction of tissue, and that it is efficient. Sterilization has not met with much favor, as there are other means which approach a nearer solution of the problem.

Another method of eliminating the mentally defective from society is by segregation. It is the universal opinion of all authorities on this subject that it is most desirable to prevent reproduction of the unfit, also that they should receive proper attention and care. By placing the feeble-minded in institutions designed and used for them alone, the question of offspring will be under control. The great objection to

segregation comes from the average citizen who does not give serious thought to the subject. He can not understand why some mentally weak member of his family should be a menace to society and placed under the control of a board of charities. Neither can he see the benefit to the State and posterity in expending large sums for maintaining institutions for such persons. In order that segregation may be successful it should be under a State commission appointed for that purpose, this commission to have full jurisdiction in handling the cases and administering the affairs of the institutions. The State should provide proper buildings to be used for this purpose alone. It is true that the cost at first would be great, but the institutions could be placed upon a self-supporting basis. Then again the individuals under such control would gradually diminish in number on account of death. Prof. E. R. Johnstone, of the Vineland School, has devised a practical plan for caring for these cases in New Jersey, which is as follows: (1) All feeble-minded children under the age of puberty should be sent to special classes in the public schools. During this time the parents bear all expenses. (2) In the large cities of the State a special institution should be established to care for those between the ages of 12 and 20. Here the expenses must be borne by the municipality, the parents contributing what they are able. (3) Those over 21 should be cared for at a State institution. (4) All idiotic cases should be sent to the State institution or the county almshouse. This plan could be carried out in any other State just as well as in New Jersey. To the writer, segregation seems the most practical solution of the problem, and is much more feasible than either sterilization or restriction of marriage.

A source of great increase among the mental defectives of this country is from immigration. During 1912 there were 216,141 babies born in New York and 239,275 immigrants reached Ellis Island. The foreign-born mother is very prolific, in fact, it has been shown that she is twice as much so as the native-born mother of this country. The present immigration law is inadequate from a mental standpoint, as it does not provide for a sufficiently thorough examination of all immigrants. The cost involving such an examination would doubtless be large, but the saving in rejection of the unfit would more than compensate for the maintenance of such an examination. Many of the States would no doubt be more than willing to provide for such means in order to decrease the vast sums they are spending to support the alien mental defective. The exclusion of this class is of great importance to society and should receive attention from the legislators. Segregation and rejection of all alien unfit is the ideal method of elimination in this country.

Insanity and feeble-mindedness are frequently used as synonymous terms, while as a matter of fact they are entirely different. Tredgold, the eminent English authority, defines *amentia* as "a state of mental

defect from birth or from an early age, due to incomplete cerebral development, in consequence of which the person affected is unable to perform his duties as a member of society in the position of life to which he was born." The condition is classified as follows:

1. Moron: High, medium, and low grade.
2. Imbecile: High, medium, and low grade.
3. Idiot: High, medium, and low grade.

It must be understood that there is no distinct line of demarcation between these various divisions, as one may frequently run into the other. The imbecile and idiot do not present any great difficulties in recognizing them, but such is not true with the moron. The latter class, especially the high-grade moron, frequently pass detection unless observed and examined thoroughly, inasmuch as they resemble the normal individual very closely. The mental defective lacks the self-respect, the conscience, and the will power of the normal. He is weak-willed, and of the irresponsible type, usually friendly, and when under careful supervision will do well, but when left to his own resources is a constant menace to himself and others. In the hands of the unscrupulous he is at their mercy and is easily led into anything. Suggestion acts as an impetus for the consummation of an act. While all criminal acts are not committed by the mental defective, they are responsible for a large number of them. Decreased resistance to disease is practically the rule with this class of cases. Dr. M. G. Schlapp, director of the Clearing House for Mental Defectives, in speaking of this condition says: "Practically without exception there is in every case a history of incorrigibility, misery, and waywardness, extending sometimes over 10 or 15 years."

Feeble-mindedness is of especial interest to the medical officer, as such individuals frequently apply for admission into a military service. This can be readily understood on account of the gradually increasing mental standard in society which is necessary for personal maintenance. Persons with amentia are unable to enter into such a competition and as the status of efficiency in the different walks of life is gradually raised, so also will the number applying for entrance into the service be increased. However, entry into such a service does not offer a safe haven, as their trials are increased and their offenses numerous. A military service is not a reformatory, neither is it an institution for the protection of the feeble-minded. Among those applying for enlistment are a large number of young men who have never been away from home influences, and consequently when they are admitted into the service are for the first time thrown upon their own resources. It is rather pathetic for one with this condition to have gained entrance into the service; the restraining influences of home having been removed, he can not protect himself from the unscrupulous. Then again such persons are unable to accustom

themselves to their environment, which is frequently changing. They have very little regard for discipline, not realizing that such a thing is absolutely necessary for an efficient military organization. From their comrades they receive considerable ridicule and as a result are greatly depressed. They are easily irritated, misinterpret orders, and are very intolerant to alcohol. The latter is especially seen in the young recruit who is easily led by his older associates. From the economic standpoint, as well as efficiency, no service desires such persons. They are a continual source of annoyance to their superiors, can not be trusted in performing duties where any ordinary ability is to be used, and are absolutely misfits.

It was formerly believed that the basis of crime was due to faulty environment. Consequently measures were taken to correct this condition as far as possible, but there was not sufficient decrease when it was accomplished to justify the above assertion. Now we are tending toward the idea that there is some mental defect in the vast majority of criminals, and this is being borne out by examinations made upon offenders before the criminal courts. Among this class are found a large number of feeble-minded. These examinations are in the form of mental tests; they are not puzzles, but conducted along scientific lines and will demonstrate the class under consideration no matter where found. The Binet-Simon scale has had many revisions since first reported, in order to meet the different environments of those examined. After being on duty for two months at the naval disciplinary barracks, Port Royal, S. C., the writer decided to make an investigation of the men confined there to ascertain the number of mental defectives. For this purpose a modification of the Binet scale as proposed by A. R. Schier, acting assistant surgeon, United States Navy, was used. These tests were completed early in 1914 when 7 were found unfit out of 100 examined. The following observations were also made: Those failing had attended school, on an average, for five years; they had only been in the naval service a little over four months when they committed the offenses for which they were being punished; the average age was 24 years; and their service records showed they were constantly in trouble. Another series of tests has just been completed at the same barracks; they were selected with a view of not eliminating capable men. It is said by some that the Binet method demonstrates lack of education rather than deficient intellect, and consequently by its use many desirable men would be rejected. This is not true, as tests are being used at the present time to detect feeble-mindedness among illiterates. It is a recognized fact that an individual who has received an education is much more qualified to perform various labors than one who has not had such advantages. In the ordinary walks of life some education is necessary and why should not this be true in a military service?

Efficiency is the watchword, and surely this can be obtained better with men of education than with illiterates. Some educational standard should be adopted which can be incorporated in the tests for amentia. The applicant for enlistment should at least be able to read, write, know the four rules of arithmetic, and properly interpret what is read. Of the 12 tests used in this examination practically only 3 require education, the others depend upon attention, imagination, judgment, memory, and reasoning. The following is an outline of the tests:

1. *Repetition of seven numerals.*—

(a) 2-7-4-9-3-5-8.

(b) 6-5-1-7-4-3-9.

(c) 7-2-4-8-1-5-3.

Normal adults can repeat seven disconnected numerals without any difficulty, but this is a hard problem for the feeble-minded. Memory and attention are demonstrated in this test. It is passed if one repetition is correct and not counted as a mistake if the order is reversed.

2. *Sentence building.*—The applicant is told to compose and write a sentence containing these three words: "Man," "River," "Boat."

The ability to write and construct sentences is shown in this test and it is easy for the mental defective, unless he is an illiterate. Passed if he writes a sentence containing one idea.

3. *Definition of abstract words.*—

Justice.	Honesty.	Charity.
Revenge.	Goodness.	

The applicant is asked what he understands by the above words, and if three correct answers are given the test is passed.

4. *Drawing from memory.*—The individual is told that a card will be shown him upon which there is a drawing; he must look at it well as he is expected to make a similar one on paper from memory. The design which is seen in figure 1 is displayed for 10 seconds, and he is told to reproduce one like it. The test is considered satisfactory if one of the figures is drawn correctly and the other about half. This problem is one of visual memory—

5. *Computation.*—

Add: (1) 18 and 17.

(2) 26 and 31.

(3) 14 and 53.

Subtract: (1) 8 from 33.

(2) 17 from 66.

(3) 23 from 97.

Multiply: (1) 4 times 8.

(2) 7 times 6.

(3) 8 times 9.

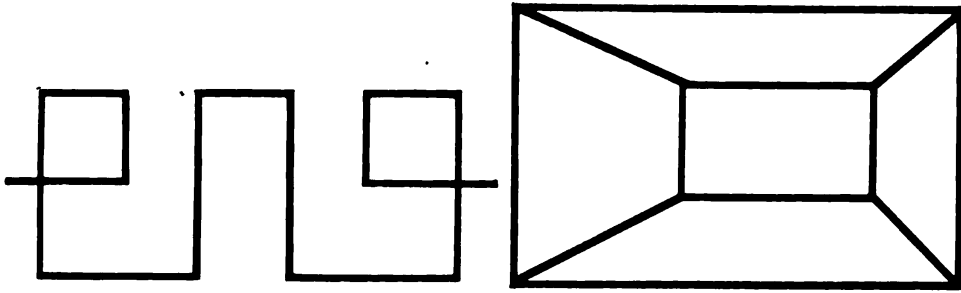


Figure No. 1 Drawing from memory

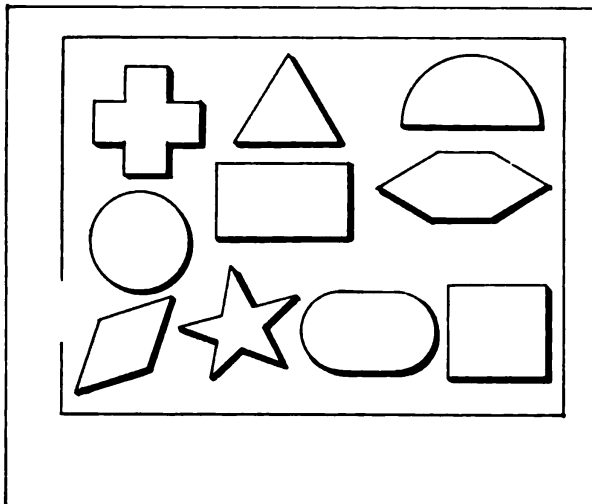


Figure No. 2 Seguin's Formboard

Jenkins—Intelligence Tests.

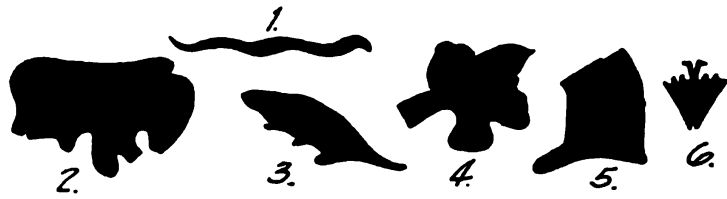


Figure No.3 Inkblot Imagination Test (Knox)

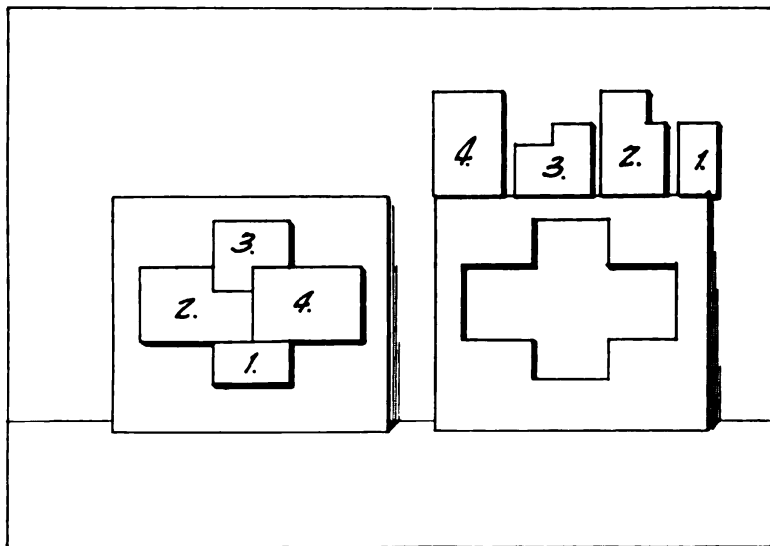


Figure No.4 Moron Test

The above is oral and demonstrates the applicant's ability to do simple figuring. It is a test of education rather than one of deficient intellect, and is passed if there are only three mistakes out of the nine trials.

6. *Seguin's form-board test*.—This consists of a form board 16 by 22 inches in area and $1\frac{1}{2}$ inches in thickness, as is seen in figure 2. The pieces are 1 inch thick and fit into sockets which are one-half inch deep, projecting one-half inch out of the board. They should not be in the board when the applicant enters. He is told that they fit exactly and that he must place them in as rapidly as possible. This brings out relationship of form. The normal individual can do this test in 25 seconds easily, and if more time than this is taken it is not passed.

7. *Recognition of absurdity in sentences*.—

(a) John Smith had three brothers—Henry, James, and himself.

(b) The police found yesterday the body of a woman cut up into 12 pieces. They believe she killed herself.

(c) A certain signpost is said to read: "Five miles to the United States naval station. If you can not read this sign, ask the sentry at the gate on the station, who will tell you the distance."

(d) As a number of accidents occur in the last car of railroad trains, this could be remedied by leaving off the last car.

The above is a difficult task for the feeble-minded. It is passed if there is only one mistake out of the four trials.

8. *The inkblot imagination test*.—The objects seen in figure 3 are shown the applicant, and he is asked what the different ones resemble. They do not represent anything in particular, but are designed to draw upon the imagination, which is poor in these cases. This is a hard test for them, but any sensible reply is considered satisfactory. It is passed if four out of the six answers are correct.

9. *Knox's moron test*.—This is a wood frame $4\frac{1}{2}$ by $4\frac{3}{4}$ inches with a wooden back, the blocks fitting easily into it. The blocks should not be in the frame when the applicant first sees it, and he should do the test several times in order to exclude the possibility of accident when placing the blocks. The test should be explained and the applicant told to put the blocks in the frame as rapidly as possible. It is passed if they are in their correct position within one minute. This is a difficult problem for the feeble-minded. His ability to profit by previous errors and powers of reasoning are shown in this demonstration.

10. *Counting from 1 to 20 and backwards from 20 to 1*.—Counting backwards may be accomplished by subtraction from the preceding number, reverse association, and by learning numbers backwards. The first two processes involve considerable mentality, while memory is shown in the latter. If the individual fails but can be taught, it differentiates ignorance from amentia.

11. *Imaginary situation.*—(a) Suppose there was a fire in the second story of a house and you had time to make one trip upstairs. Upon reaching there the only articles found in the nearest room were a typewriter and a mattress. One must be thrown from the window and the other carried downstairs. Which one will you carry down?

(b) Two men are shipwrecked several hundred miles from land. They saved 40 pounds of bread and 40 pounds of gold. The boat is small and they are obliged to throw either the bread or the gold overboard in order to keep the boat from sinking. Which would you keep in the boat?

(c) A railroad switch 1 mile from the station has been accidentally left open. The express which does not stop at this station will arrive in three minutes. What would you do under these circumstances?

Under such conditions even normal individuals may become excited and do unexpected things. However, this test will give an idea how the applicant would act, and is passed if there is only one incorrect answer.

12. *Syllogisms.*

(a) If you were going to sweep the stairs, where would you commence?

(b) I am taller than my father, my father is taller than my brother. Who is the tallest?

(c) Two men are shipwrecked in midocean in a small boat. They managed to secure some provisions and two buckets of fresh water before leaving the ship. One bucket of water was used the first day. On the morning of the second day one of the men's clothing caught on fire while he was smoking. What would you have done if you had been his companion?

The above are read to the applicant, and an answer is required. Reasoning and constructive imagination are poor in feeble-mindedness. This is passed if two correct answers are given.

The 12 tests were tried on 130 men, and of this number 12 were found deficient. All worked hard and seemed to be especially anxious to give a correct answer to the questions asked. The following table shows how long each individual attended school:

1 year.....	3	8 years.....	19
2 years.....	8	9 years.....	3
3 years.....	6	10 years.....	7
4 years.....	12	Through high school.....	11
5 years.....	14	In school for 30 days.....	1
6 years.....	22	Never attended school.....	4
7 years.....	20		

It must be remembered that when a large number of men are examined at one time, the various problems are told the others by those examined. They discuss the answers of the different problems and

also have time to prepare for them. It is believed that this happened in the present examination. When possible the tests were changed from time to time in order that the individual would not have the benefit of any outside preparation. The number of successes in each is seen in the table below:

Test.	Normals.	Feeble-minded.	Test.	Normals.	Feeble-minded.
1.....	108	7	9.....	90	2
2.....	118	11	10.....	118	10
3.....	108	8	11.....	114	7
4.....	94	2	12.....	107	7
5.....	102	3			
6.....	117	11		1,289	80
7.....	102	2	Average number of suc-		
8.....	111	10	cesses.....	10.9	6.6

From the above it will be seen that the average number of tests passed by the normal were 10.9, while the feeble-minded were only successful in 6.6. None of the normals failed in more than three problems. Upon this result it was decided that for one to be considered normal he should pass 9 out of the 12. Dr. Yerkes of the Boston Psychopathic Hospital has recently worked out a point method of marking tests according to the difficulty involved in solving each one. This new method is fair and will be a valuable addition to the scoring of successes and failures.

A summary of the 12 failures is given below.

No.	Former occupation.	Age.	School.	Family history.	Enlistment record.
8	Farm laborer.....	18	5 years.....	Negative.....	3 minor offenses; desertion.
25	Laborer.....	20	4 years.....	do.....	Deck court, 2 minor offenses; deser-
46	Laborer in R.R. shops.	19	No schooling..	Insanity in family.	tion.
49	Bar tender.....	29	3 years.....	Negative.....	1 minor offense; deck court; deser-
59	Laborer.....	19	5 years.....	do.....	tion.
64	Laborer.....	19	7 years.....	do.....	1 minor offense; desertion.
79	Laborer.....	19	6 years.....	do.....	4 minor offenses; desertion.
98	Laborer.....	31	7 years.....	do.....	1 minor offense; desertion.
106	Painter.....	22	2 years.....	Epilepsy on maternal side.	2 summary courts-martial; deser-
107	Laborer on ranch.....	30	9 years.....	Tuberculosis on paternal side.	tion.
108	Seaman in merchant marine.	29	5 years.....	Negative.....	Do.
112	Laborer.....	23	4 years.....	do.....	Desertion.
					Deck court; summary court-mar-
					tial; desertion.
					Deck court; 2 summary courts-mar-
					tial; desertion.
					Deck court; summary court-mar-
					tial; desertion.

The average age of the above table is 23 years and the average number of years in school is 4.7. One individual had never been to school, but failed only in one of an educational nature, which was computation. All of the 12 were born in the United States, and the charges for which they were sent to the disciplinary bar-

REVIEW AND POSSIBILITIES OF MENTAL TESTS IN THE EXAMINATION OF APPLICANTS FOR ENLISTMENT.

By A. R. SCHIER, Acting Assistant Surgeon, United States Navy.

Studies and investigations have been in progress in the military-naval service, looking toward the solution of a most difficult and perplexing problem, that of detecting mental deficiency in those applying for enlistment. The benefits resulting to the service from the discovery of any existing deficiency before enlistment, are self-evident. A diagnosis of the higher grades of defect in the recruiting station, unaided by any reliable previous history and with only a short period of observation, requires more than the mere "sizing up" of the applicant. The determination of mental status by this method is not likely to give accurate results and is surely not satisfactory. Opinions differ regarding the usefulness of the various systems of mental tests devised for this purpose. All alienists agree, however, that some definite psychological tests should be an essential part of every thorough examination for suspected feeble-mindedness, especially the higher grades. In view of the increasing attention, which this subject is receiving, it may be of timely interest to briefly review some of the results with mental tests at the Marine Corps recruiting station, St. Paul, Minn., and to suggest such possibilities as seem indicated by their use.

TESTS AND THEIR PURPOSE.—In a previous article in the Naval Medical Bulletin, the writer submitted for trial a series of 10 tests to aid the examiner in differentiating the normal from the feeble-minded individual; emphasizing at the same time the probable necessity of changes and modifications, after their more extended use. These 10 tests were selected after the trial of many mental tests on both normal and feeble-minded males of the usual age of those seeking admission to the service. The minimum number of tests to be successfully passed was tentatively fixed at seven. The continued application of these tests during the past year has demonstrated no need of change in the tests themselves. The range of mentality measured by them is sufficient for the purpose for which they are intended, namely, the detection of the so-called moron. This individual is not obviously defective, is seldom suspected of feeble-mindedness, and is not infrequently met with in the recruiting station. By far the large majority of morons fail to score a passing mark with these tests, yet some will pass all of them. It is unreasonable to expect any series of tests to reveal every form of mental defect, or to detect every type of offender or criminal. Only in so far as habitual offense against law and order, unmorality, and criminality are the result of feeble-mindedness, may we look for aid from these tests. An astonishing number of offenders have, however, been found to be feeble-minded, and it is said that nearly half of those punished are paying

the penalty for their stupidity rather than for their wickedness and criminality.

POINT METHOD OF SCORING.—By the method of scoring first used all the tests had an equal value and no credit was given for parts of tests successfully passed. This was found to require modification. Because of the varying difficulties of the tests each should be given a relative value in the final score. The Yerkes-Bridges point scale, in use at the Boston Psychopathic Hospital, suggested the thought that a similar method should be worked out for this series. On the basis of success varying inversely with the difficulty of each test, the relative point value for each test of the series, computed on the scores of all examined so far has been fixed as follows:

	Total possible points.
1. Repetition of numerals (three sets of digits; each correct repetition, 2).....	6
2. Drawing design from memory (one design drawn correctly, 3; both correct, 5).....	5
3. Sentence building (if two or more sentences formed with three words, 2; if three words included in one sentence, 3).....	3
4. Computation, orally (nine problems; each correct answer, 2).....	18
5. Form-board puzzle (if blocks filled in correctly in 55 seconds).....	10
6. Definition of abstract words (five words; each correct answer, 2; dictionary definition not required, object being only to determine if abstract meanings are comprehended).....	10
7. Recognition of absurdity (four sentences; each correct recognition, 3).....	12
8. Problem of diverse facts (two problems; each intelligent answer, 5).....	10
9. Reading and report (cowboy story; if read and reported correctly, 3; changes, instead of word "purchase" use "bought"; instead of word "donned" use "put on").....	3
10. Clock test (first answered correctly, 10; second answered correctly, 13).....	23
	<hr/> 100

CLASSIFICATION INTO GROUPS.—One hundred consecutive physically qualified applicants were examined with these tests and marked in accordance with the above point scale. It was decided to reject none, irrespective of the scores made, unless some good cause for nonacceptance was found. Those given low mental ratings by the tests were classed as "controls," for comparative purposes. Reports on the intelligence, aptitude for the service and behavior of many were received from the recruit depot, subsequent to enlistment. These reports made after a period of observation, in connection with the points scored at the recruiting station, make it possible to classify these men into four groups, as follows:

Groups.	Points scored.	Subsequent reports.
A.....	75-100.....	Well above to average.
B.....	60-75.....	Above to average.
C.....	50-60.....	Average to doubtful.
D.....	Below 50.....	Mentally deficient.

RESULT OF TESTS.—In Table 1, which follows, are shown the number in each group accepted, those rejected at the recruiting station, and cause, and per cent of loss previous to enlistment and other data of interest.

TABLE 1.—*Before enlistment.*

Group.	A.	B.	C.	D.
Qualified physically.....	74	12	11	3
Accepted and transferred.....	74	12	10	*2
Average age.....	22.6	22.2	23.0	21.3
Average years in school.....	8.2	6.7	8.1	5.3
Rejected, recruiting station:				
By officer in charge—				
Deserter from Navy.....			1	
By medical officer—				
Feeble-minded.....				1
Eloped enroute.....	2			
Rejected, training station:				
By commanding officer—				
Under age.....		1		
Discharged by survey from United States Navy.....			1	
By medical officer—				
Physical defect.....		1		
Mental deficiency.....				1
Declined oath.....			2	
Enlisted..... per cent.....	97.3	83.4	64.0	50.0
Loss before enlistment..... per cent.....	2.7	16.6	36.0	50.0

* Controls.

The mental ratings subsequent to enlistment are shown in Table 2, together with the per cent of loss from various causes, per cent remaining in the service, and total loss for each group.

TABLE 2.—*Subsequent to enlistment.*

Group.	A.	B.	C.	D.
Intelligence:	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>
Well above average.....	27.0	18.0		
Above average.....	17.0	18.0	9.0	
Average.....	55.0	63.0	44.0	
Below average.....			47.0	100.0
Aptitude:				
Excellent.....	26.0	18.0		
Very good.....	42.0	62.0	62.0	
Good.....	31.0	18.0	38.0	
Fair.....				100.0
Behavior:				
Excellent.....	85.0	100.0	50.0	100.0
Very good.....	9.0		50.0	
Good.....	4.0			
Signalmen, squad leaders.....	20.0	3.0		
Deserters.....	9.0	20.0	42.0	
Remaining in service.....	88.0	66.0	37.0	50.0
Total loss, all causes.....	11.0	33.0	63.0	50.0
Per cent of total loss.....	6.9	20.9	40.0	31.8

It will be seen from a comparative study of these tables, that the mental ratings given after a period of observation at the recruit depot in the main correspond with the degree of mental ability found at the recruiting station, as indicated by the number of points scored. This may be regarded as evidence of the accuracy of the tests to determine the grade of intelligence. Previous school training appears to be a minor factor in regard to success, as shown by the lack of correlation

between years in school and mental group. It can not be denied that the reading, writing, and computation tests are dependent more or less for success on school training. However, the series as a whole measures not previous education but native ability. It is of interest to note the progressively increasing loss, in particular from desertions, from groups A to C.

SAFE AND DEPENDABLE GROUP.—Judged by intelligence, aptitude for the service, and conduct, those coming in groups A and B may be regarded as reasonably safe and dependable individuals. Although there was some loss from these groups by desertion, it may perhaps be of significance that the majority deserted after the sixth month, about the eighth and ninth. This is in favorable contrast to the desertions from group C, which occurred from one to four months after enlistment.

DOUBTFUL GROUP.—In the sense that greater care should be taken before acceptance, those coming in group C are termed doubtful. While not all in this group were found undesirable, yet the fact that only 37 per cent remain in the service, and one of these is reported as "slow to learn," should make greater efforts to learn more of their past, and longer periods of observation before acceptance justifiable. Such a course might be well repaid, as illustrated by the experience with two of this group. One of these, rejected at St. Paul, after careful questioning admitted having deserted from the Navy, after two months of training. Previous to his enlistment he had been an inmate of a State reformatory and after his discharge had tramped around the country. The other, accepted at St. Paul and rejected at the recruit depot, had been discharged by survey from the Navy, as was learned later. Two of this group declined oath after accepting transportation to the recruit depot. The loss from such causes, together with a 42-per-cent loss by desertion, suggests the advisability of considering them doubtful and the need for more observation and past history before acceptance.

MENTALLY DEFICIENT GROUP.—Group D, that of the lowest mental rating, may be termed the subnormal, mentally deficient, or feeble-minded group. Of the three coming in this class, two were mentally deficient and the one enlisted was reported as below average and as showing only fair aptitude for the service. The diagnosis of feeble-mindedness, in the one rejected at St. Paul, was confirmed by the superintendent of the Wisconsin Institution for Feeble-Minded, where he had been an inmate. His residence there was learned only after considerable inquiry. His record at the institution states that "he is superficially bright, having depraved sexual tendencies, and is classed as a high-grade imbecile." The rejection of the "control" of this group at the recruit depot was because of mental deficiency.

This classification into reasonably safe, doubtful, and mentally deficient groups as a result of points scored, based as it is on only one hundred applicants, would undoubtedly be materially changed if larger numbers were examined. However, it points out a line of research which it might be well to undertake. The opportunity for examining large numbers of physically fit men is limited in the recruiting office, and to follow such men after enlistment requires long periods of time. It is confidently believed that a scientific classification according to mentality could be devised after testing large numbers of men and observing their conduct and efficiency after they enter the service. From an economic and efficiency standpoint such a classification, with its resulting elimination of many hitherto unrecognized mental defectives, would be well worth the efforts expended.

To be of value any system of mental tests must be applied according to directions. The tests can not be varied to suit the individual, nor can mental deficiency be diagnosed after using one or two tests of the series. To measure mentality a wide range of functions must be tested and the results pooled. That the final scores are influenced by the examiners' equation can not be denied. However, if the directions are strictly followed this factor is reduced to a minimum and is certainly less in the usual examination. Mental tests can not be compared to a "yardstick" which will give exactly the same results in all hands. It is to be remembered that the tests used and submitted for trial by the writer are intended for examination in the recruiting station, where no reliable previous history or a long period of observation may be expected to aid in diagnosing mental deficiency.

CONCLUSIONS.

The continued examination of applicants for enlistment with the series of mental tests, previously submitted for trial, has demonstrated the usefulness of these tests in detecting feeble-mindedness.

Only in so far as habitual offense, unmorality, and criminality are the result of feeble-mindedness are such tests of diagnostic value.

The method of scoring first used has been modified by working out a point scale, based on the relative difficulty of each test.

On the basis of points scored, and conduct and efficiency after enlistment, men may be classified into safe and dependable, doubtful, and mentally deficient groups.

A classification according to mentality could be established only after large numbers of men had been tested and their conduct subsequent to enlistment noted.

Investigation looking toward the establishment of such a classification, it is believed, would be of value, inasmuch as it would eliminate many hitherto unrecognized mental defectives from the service.

OBSERVATIONS ON DEEP DIVING.

By G. R. W. FRENCH, Passed Assistant Surgeon, United States Navy.

In order to comprehend deep diving a knowledge of the diving apparatus is essential. The parts of the diving apparatus are as follows:

1. The dress.
2. Breastplate.
3. Helmet with various valves, etc.
4. Diving hose.
5. Pumps.
6. Weights (belt and shoes).
7. Telephone.
8. Life line.
9. Diving gloves.
10. Overall dress.

The dress is of flexible material made of sheets of rubber between cotton twill and reenforced at the points of wear. It is so constructed that it incloses the entire body with the exception of the head and hands.

The sleeves of the dress terminate in an elastic cuff which forms a traxit joint at the wrist and prevents the escape of air or the inlet of water under normal conditions.

The neck of the dress terminates in a rubber gasket, or collar, with an inside portion of cloth called the bib. The purpose of the collar is to attach the breastplate to the suit, the breastplate fitting between the rubber collar and the bib. The bib fits loosely and comes well up inside of the neck piece of the breastplate. The object of the bib is to collect any water that may enter the helmet through the valves and prevent this water from coming in contact with the diver's body. The function of the dress is simply protective, protecting the diver's body from wet and cold.

It is considered that the present type of diving dress in use in the Navy is defective in design and the following improvements are recommended:

1. Increasing the length of the body of the dress, i. e., length between the crotch and collar to allow more freedom of motion in bending (flexing the trunk).
2. Increasing the length of the arms to allow more freedom of motion in reaching overhead, as in climbing.
3. Adopting a diving suit with laced legs. This is most important for the following reasons: In the present type of suit the legs are large and baggy and allow considerable space for air accumulation. If for any reason air accumulates in the legs of the present type of suit, as is often the case with the diver working in a prone condition, the

legs become more buoyant than the head, which causes the diver to lose control of himself, usually resulting in the diver being "blown up," i. e., carried rapidly to the surface, either feet first or in a prone position, and helpless. In the improved type of suit with the laced legs this danger is eradicated as the legs are laced snugly to the body and there is no space in the legs of the suit for air accumulation.

Formerly crinoline was worn inside of the dress with the idea that it was a protection from outside pressure. This is a false idea. The use of crinoline is dangerous. It is useless and encumbering and should be discarded as a useless piece of apparatus.

The breastplate is that portion of the diving apparatus which connects on the lower end with the dress and on the upper end with the helmet. It is of tinned copper and so made that the lower portion fits comfortably over the shoulders, a pad usually being interposed between the shoulders and the breastplate. Its upper end is circular and comes on a level with the larynx.

The breastplate is attached to the dress by means of screw studs which pass through holes in the rubber collar. Four metal straps conforming with the curvature of the breastplate are placed over these studs and held in place by wing nuts. When these nuts are screwed down the collar of the breastplate is compressed between the straps and edge of the breastplate, thus forming an air-tight joint.

It is considered that the Navy breastplate is too wide and it has been recommended that the breastplate be made narrower to allow more freedom of motion in reaching upward.

The helmet is attached to the circular ring at the neck of the breastplate by an interrupted screw joint in the most improved models. A small stop, or pin, is provided at the back of the helmet which is turned down into a recess on the breastplate as a precaution against the helmet screwing off.

The helmet is a tinned copper dome which encloses the diver's head, fitting tightly to the circular neck of the breastplate by means of an interrupted screw joint. A gasket is interposed at the joint between the helmet and breastplate, making an air-tight joint. The helmet is constructed with four windows. One is directly in front of the diver's face called the faceplate. It is the last piece of the helmet to be applied and is usually adjusted while on the ladder just before the diver makes his descent. The other three windows are made in the helmet and are not removable, being glazed in. Two are placed one on each side of the helmet, on a level with the faceplate, so as to enable the diver to see laterally. The fourth is placed in the mid line of the helmet above the faceplate and permits the diver to look upward.

The air-inlet valve is placed on the back part of the helmet above the interrupted screw joint. This valve is a nonreturn valve, or

check valve, and its proper functioning is most important. The check valve should be capable of standing a back pressure considerably more (500 pounds to the square inch) than the pressure at which the diver is to work. Air enters through this valve into the helmet and it should be capable of admitting air at a pressure of one pound to the square inch. The nonreturn function of the inlet valve is most important for the reason that if the pressure supplying air to the diver were to fall appreciably or suddenly on any account, as for instance, a ruptured hose, the result would be an immediate squeeze to the diver, and if working at any depth beyond ten feet results are liable to be serious. If the depth at which the diver is working is beyond fifteen feet the results are apt to be fatal.

The regulating escape valve is fitted into the right side of the helmet in the rear of the side window and at about the level of the ear in the present types in use in the Navy. The valve seats with the water pressure and against the air pressure within the dress. An excess of air over water causes the air to escape into the surrounding water. The valve is provided with a spring and regulating screw on the water side by means of which the diver can regulate the inflation of his dress, and, thus, his buoyancy. Setting up on the regulating screw compresses the spring and applies tension on the valve, in addition to the water pressure, and an increased pressure of air is necessary to open the valve. The improper adjustment of this valve is the cause of a most vicious trend of circumstances to the diver. As a diver enters the water pressure is applied to the outside of his dress and tends to force the air into the upper portion of the dress and out the valve. Setting up on the regulating screw retards this escape in proportion to the tension of the regulating spring. If freely open and the air supply is inadequate, the dress will collapse and the diver's breathing will be interfered with. If partly closed and the air supply is of sufficient volume, too great an inflation of the dress will result and will be followed by an excess of positive buoyancy. Overinflation is the cause of "blowing up" of a diver, which is a serious accident if from any considerable depth.

There are various types of regulating escape valves. The ones in most common use are the Morse the Schrader, and the Siebe-Gorman.

A serious fault in these escape valves now in use is that they can not be entirely closed. If means of entirely closing were provided it would be possible for a diver to ascend from any depth without assistance from the surface. The present location of the valve is determined by the construction of the helmet and it is not accessible to all divers. It should be brought farther forward and down near the junction of the helmet and breastplate, in order to be more readily reached by the diver and to maintain a more equal pressure

of the air within the air passages and the water without on a minimum air supply with the diver in the erect position.

A new type of air-escape valve has been designed by G. D. Stillson, gunner, United States Navy, which meets with these requirements. This valve can be completely closed and will not jam. If for any reason a diver wished to ascend on account of a short air supply, by closing this valve completely he will attain positive buoyancy and will be able to ascend readily instead of being forced to struggle up his descending line.

In the latest type of helmet there is an extra valve placed to the right and on a level with the faceplate. This valve is operated by the diver. The object of this spit cock is to allow an escape of air from the suit. If for any reason there is an overaccumulation of air in the suit and the regulating escape valve does not allow sufficient escape, the diver opens this spit cock, allowing the excess air to escape.

The diving hose is 1 inch external diameter and one-half inch internal diameter. It is made up in 50-foot lengths which are coupled together by gun-metal fittings, alternate male and female. Openings through the couplings are three-eighths inch in diameter. When new, the hose is capable of withstanding a pressure of 500 pounds to the square inch for 10 minutes.

The diving pumps in the Navy are not standardized as to dimensions, capacity, etc. Those most generally used are two-cylinder, double-acting diving machine air pumps. They are designed to furnish one-fifth of a cubic foot of air per revolution (measured at atmospheric pressure). Provision is made for supplying air to two divers in shallow water and one diver in moderately deep water. The cylinders are surrounded by a tank for holding water. The gages on the case of the pump indicate the pressure of air delivered from each cylinder. The pump is secured in a wooden case and provided with ring bolts for securing and lifting about and hoisting. At present there is no standard pump and the efficiency of every pump varies.

Early in the diving experiments it was found that proper ventilation of the helmet could not practicably be secured by hand-driven air pumps in deep diving, and air from power-driven compressors, i. e., air accumulators, was utilized. In order to use air from air accumulators, some means of controlling the amount of air supplied to the diver was necessary. This was met by interposing an additional valve (the Stillson air-control valve) on the diving hose, close to the helmet. This valve is a needle valve attached to diver's breast plate on the left side and is operated by the diver.

The weights used in diving consist of diving belt and diving shoes, the object of these being to cause negative buoyancy when the diver's suit is inflated with air.

The diving shoes consist of a heavy leather shoe with a heavy lead sole. An improved type of diving shoe was tested and found superior to the old type. This shoe, which is more comfortable than the old type, is made with a wooden inner sole in addition to the lead sole and is fitted with a brass toe cap. The wooden inner sole helps to permanently maintain the shape of the shoe. The brass toe cap not only protects the shoe from wear but also the diver's toes from injury. In addition to the securing strap, eyelets for lacing are provided and are considered essential to prevent the shoe from coming off.

The diving gloves, made of the same material as the diving dress, are attached to the outside of the sleeve of the dress by means of metal rings and clamps provided for the purpose. These are neither useful nor ornamental. They are a source of danger and should be improved. When worn, the diver can not use his fingers to control the valve and apparatus as they become distended with air, and he is unable to functionate his hands.

An overall dress is provided to protect the diving dress from chafe and wear. It is cumbersome and seldom used. Overall trousers with adjustable straps answer the purpose of the above. By means of adjustable straps of suspenders the distance between the helmet and the crotch of the diving dress can be regulated to keep the helmet from receding over the diver's head when the dress is inflated with air. This adjustment is important, but is not generally known or practiced.

The underclothing and socks that the diver wears are of medium weight wool and are for use when working in water of low temperature. It is considered that additional suits of heavier weight wool could be added to the diving outfit, as the present suits are not sufficiently warm for work in very cold water.

The present type of Navy diving telephone consists of a simple receiver and transmitter permanently secured in the helmet and connected in series with the tender's instruments and battery.

This has been found to be absolutely useless for the purpose intended. Ten different types of telephones were tried during the diving test. None of the types with the single receiver were found satisfactory. While it was possible for the diver to communicate with the tender with this type it was impossible for the tender to satisfactorily communicate with the diver, especially with the present type of diving apparatus, on account of the noises in the helmet produced by the pounding of pumps and the escape of air from the helmet.

The problem of the telephone was finally solved by G. D. Stillson, gunner, United States Navy, by using double receivers fitted with large flexible rubber ear pieces which exclude all helmet noises from the diver's ears. Even with the proposed type of telephone the

noises in the helmet are audible to the tender, but these do not interfere with communication.

The effects of compressed air on the diver's voice are noted over the telephone. The tone of voice is metallic and very loud.

While the timbre of the voice is lost in moderately deep depths, there is no trouble in understanding the diver in depths to 274 feet, if he speaks in a moderate voice.

In deep diving it is considered that a suitable diving telephone is essential.

For the purpose of raising and lowering the diver to and from the bottom, a 21-thread manila rope is provided. This is furnished in 120 feet lengths and is also used as a signal line. On account of the inefficiency of the present type of telephone the only means of communication with the diver is by signals (pulls) on this line. This method limits the diver to a most elementary set of signals and with any drag on the line, as from tide, these are often interfered with.

With the present method of diving in our Navy there are three lines to the diver, i. e., diving hose, telephone cable, and life line. It was hoped by giving the diver absolute control over his buoyancy (by a sufficient and perfectly controlled air supply) that the use of the life line could be abandoned, thus lessening the drag of tide on the lines. This was found impracticable without interfering with safety.

The most improved type of life line is one which embodies the telephone cable.

PHYSICS OF DIVING.

Atmospheric pressure is that pressure exerted by the atmosphere and is equal (average) to 14.7 pounds to the square inch.

Gage pressure: The gages used in diving do not record atmospheric pressure. The zero mark of the gage corresponds to atmospheric pressure. The pressure read on the gage is referred to as gage pressure or excess pressure.

Absolute pressure is that pressure above a perfect vacuum, or absolute pressure is atmospheric pressure plus gage pressure, or 14.7 plus excess pressure.

Every 33 feet of sea water (depth) or 34 feet of fresh water exert a pressure of one atmosphere. Hence, every foot of sea water (depth) exerts a pressure of $\frac{14.7}{33}$, or 0.44545+ pounds to the square inch. Thus a diver working in a depth of 165 feet of sea water would be working in $\frac{165}{33}$ or five atmospheres of excess pressure or six atmospheres absolute pressure.

When a diver stands erect in the water the pressure exerted on his feet and legs is about two pounds per square inch more than that exerted on his head and chest.

A body submerged in sea water is buoyed upward by a vertical upward force that is equal to the weight of the displaced sea water. This pressure equals 64 pounds for each cubic foot of the volume of the submerged body.

On a diving suit distended with air the number of cubic feet of water to be displaced is greater than the combined weight of the suit and helmet and diver. As a result the suit and diver are positively buoyant and the diver is unable to descend.

To overcome this positive buoyancy weights are attached in the form of a leaded belt and leaded shoes, giving the diver negative buoyancy. Only sufficient weight is added, however, to overcome this positive buoyancy with the suit moderately distended with air.

If, for any reason, the suit is overdistended with air the diver attains positive buoyancy, and if below the surface of the water, he will be carried rapidly to the surface unless he holds to something which will enable him to overcome the positive force of his buoyancy. Being carried to the surface in this manner is known as "blowing up."

Divers working in shallow depths often blow themselves up voluntarily. If this happens from deep depths the results are liable to be serious, and this is an accident to be constantly guarded against with divers working in deep water.

In the old method of diving (pumps), if a diver found himself accumulating too much air in the suit with insufficient escape from the escape valve, by putting his hands over his head and slipping a finger under the cuff and expanding it excess air was allowed to escape. With the new method, i. e., spit cock on helmet and a perfectly controlled air supply from air accumulators, the danger of this accident is lessened.

The composition of air is approximately 20.96 per cent oxygen and 79 per cent nitrogen, carbon dioxide varying from a trace to various percentages in different localities. A standard of 0.04 per cent of CO_2 is considered as the maximum amount that should be present in problems of ventilation of houses, ships, etc.

Air follows the law of gases. According to Boyle's Law the volume of a gas varies inversely as the pressure (absolute). That is, air under six atmospheres pressure would measure one-sixth of its volume measured at atmospheric pressure. Example $\frac{14.7}{6 \times 14.7} = \frac{1}{6}$.

According to Charles's Law the volume of a gas varies one-two hundred and seventy-third of its volume for every variation of 1° Centigrade, volume increasing with rise of temperature and decreasing with fall of temperature.

The variation of volume due to temperature is disregarded in diving. When air is compressed by power compressors it becomes heated. The following table shows the additional rise of temperature for each atmosphere of additional pressure.

Heat produced by compression of dry air without cooling:

Pressure above at- mospheric.	Tempera- ture of air.
<i>lbs.</i>	<i>°</i>
0	60.0
14.7	175.8
29.4	255.1
44.1	317.4
58.8	369.4
73.5	414.5
88.2	454.3
102.9	490.6
117.6	523.7
132.3	554.0
205.8	681.0
379.3	781.0

NOTE.—The presence of moisture will increase the results as it increases both the specific heat and the heat conductive capacity.

From the above it is evident that this air must be cooled before being supplied to the diver. In the use of hand-driven pumps on account of the water about the cylinders, and the dissipation of heat on the hose, etc., the air on reaching the diver is sufficiently cool to cause no great discomfort up to depths that have been reached heretofore by the use of hand diving pumps.

In utilizing air from air accumulators it is evident that this air is cooled before reaching the accumulators. Accumulators are charged by power compressors and all power compressors are fitted with an elaborate water-cooling system for the compressed air, so that the danger of supplying air too hot to the diver is practically nil.

With the diver in the usual Navy type of diving suit, i. e., a suit with a compressible dress and a rigid noncompressible helmet it is essential that the following conditions be maintained:

A. The diver must be able to ascend and descend, or stay in water of varying depths, maintaining at all times the air pressure within the suit to a slightly higher pressure than the water without; i. e., suit moderately extended with air.

B. The diver at all times must have perfect control of his buoyancy, i. e., maintain positive, or negative, as he so desires, and be so balanced that he will be able to perform useful work.

C. The minimum circulation of air through the helmet must always equal

$$1.5 \times \left[1 + \frac{\text{depth in feet of sea water}}{33 \text{ (if fresh water, 34)}} \right],$$

or

$$1.5 \times \left[1 + \frac{\text{number lbs. to sq. in. excess pressure exerted by water}}{14.7} \right],$$

or $1.5 \times \text{number of atmospheres absolute pressure, cubic feet (measured at atmospheric pressure) per minute.}$

NOTE: With the new method of diving it is recommended that at least two or three times this amount of air be delivered. (See "Physiology of diving.")

When a diver enters the water the increased pressure at his extremities drives the air from the lower portion to the upper portion of his dress, the lower part of the dress being forced up against his body. The diver descending farther into the water regulates his escape valve so that sufficient air is forced out of his suit to cause a negative buoyancy that will permit him to descend. Air forced into the helmet increases the pressure within the suit as the diver descends, causing the pressure within to equalize the water pressure without, and soon a slight increase of the inner pressure forces the air out of the regulating escape valve and causes a ventilation of the helmet.

Suppose a diver working at shallow depths should fall suddenly with no sudden ingress of compressed air into the suit. What would be the results?

The diver is working in a compressible dress and a rigid helmet so constructed that any increase of water pressure over air pressure within the helmet causes the regulating escape valve to seat, therefore no water can enter the helmet. Air is forced from the compressible dress into the noncompressible helmet, volume diminishing with increased pressure. If this volume of air does not fill the helmet and equalize the pressure of the water at the depth to which the diver has fallen, the extra pressure is exerted on the diver's body, tending to drive him into the helmet. The result is a serious injury or immediate death.

Falls from shallow depths to deeper depths are the most fatal, as the relative difference of pressure is greater. That is to say, a diver at the surface in 14.7 pounds pressure to the square inch (absolute) falls into water 33 feet deep; every square inch of his body has an additional pressure of 14.7 pounds, or 29.4 pounds absolute pressure to the square inch, or a proportion of 2 to 1 over the pressure in the helmet. As the body has a surface area of 2,000 square inches, quite a few tons (14.7) pressure are exerted on the diver's body, driving him into the rigid helmet.

Falls from moderate depths to deeper depths are not as serious as falls from shallower depths, i. e., in a fall from surface to 33 feet the relative difference in pressure is 2 to 1, while in a fall from 168 feet to 201 there would be a difference in pressure as 6:7 and the result would not be as serious.

To overcome the danger from squeeze a new type of collapsible helmet has been designed by a German. The object is to have the helmet collapse before any dangerous extra pressure is exerted on the diver's body. This type of helmet is not considered as practicable as the usual rigid helmet.

With the newer method of diving—that is, the use of air from air accumulators—the adjustment of air control is so perfect that the danger from falls is greatly minimized. The adjustments are so fine the diver is usually able to prevent a fall by opening his air control valve widely, thus maintaining a sufficient volume of air within the suit at sufficient pressure to prevent a fall.

The air adjustment with this method is so perfect that the diver can allow himself to sink in the water with no supporting line (this has been done innumerable times in depths to 33 feet) without the slightest squeeze.

The question of air circulation through the helmet will be considered under “Physiology of diving.”

PHYSIOLOGY OF DIVING.

In average figures the composition of the air in volume per cent equals:

Nitrogen.....	79.00 per cent.
Oxygen.....	20.96 per cent.
Carbon dioxid.....	.04 per cent.

Expired air varies in composition with the depth of the expiration and with the composition of the air inspired.

Under normal conditions the expired air contains in volume per cent:

Nitrogen	79 per cent.		
Oxygen	16. 02 per cent.		
	N	O	CO ₂
Inspired	79	20. 96	0. 04
Expired	79	16. 02	4. 38
		4. 94	4. 34

That is, expired air loses 4.94 v. p. of O₂ and gains 4.34 per cent CO₂. The difference in the oxygen absorbed and the CO₂ excreted is explained by the fact that in the physiological process of the body some of the O is absorbed by the body, not only to oxidize carbon but also to combine with some of the hydrogen of the food, and is consequently secreted as water.

The composition of alveolar air can not be accurately determined, but is estimated as follows:

Normal expiration contains 500 c. c. (equal normal breathing). The capacity of the bronchial tree is 140 c. c., and this air may be considered as similar in composition to atmospheric air, i. e., the inspired air. Hence alveolar air constitutes only 360 c. c., or eighteen twenty-fifths of the entire amount. If expired air contains 4.38 per cent CO₂, then alveolar air must contain 4.38 divided by $\frac{18}{25} = 6$ per cent.

According to Haldane and Priestley, an average adult man at rest breathes one-fourth cubic foot of air per minute. The volume respired is regulated as follows: At normal atmospheric pressure each person automatically regulates his breathing, so that the alveolar air contains about 5.6 per cent of CO_2 (varying slightly in different individuals, but constant for same individual). If the percentage rises breathing becomes increased to effect compensation; if it falls breathing is diminished or suspended until it again reaches normal. Moderate work increases the CO_2 secreted by the lungs to three or four times, and hard work six to eight times the resting normal amount. The air breathed is consequently increased. If the inspired air contains CO_2 , the volume of air breathed is likewise increased in such proportion as, if possible, to keep the alveolar percentage nearly normal. Thus, if inspired air contains 3 per cent CO_2 , breathing will be about doubly increased, and moderate work in such air will cause moderate dyspnea. Six per cent causes distress, and 10 per cent a tendency to unconsciousness.

When pressure is abnormal the law just stated does not hold, and it is found that what does remain constant is not the percentage, but the absolute pressure exercised by the CO_2 ; i. e., $\frac{3 \text{ (per cent } \text{CO}_2\text{)}}{9 \text{ (atmospheres)}}$ or one-third per cent of CO_2 , would have the same effect on a diver in 264 feet of sea water as 3 per cent of CO_2 would at atmospheric pressure. The same law has been found to hold in air of two-thirds atmospheric pressure.

It has been found that at rest the average man produces about 0.84 cubic foot of CO_2 an hour (measured atmospheric pressure), or 0.016 cubic foot per minute. Haldane, in his work, found by actual analysis that the diver at rest produced 0.019 cubic foot CO_2 per minute, and with moderate work 0.045 cubic foot per minute (measured under normal conditions). Volume of gas varies inversely as the pressure, hence this volume under moderate work must equal 0.045 divided by atmospheres, absolute pressure.

Owing to the limited capacity of the hand-diving pumps, even in series, the delivery of air was so small that a standard of CO_2 , equal to 3 per cent divided by number of atmospheres, absolute pressure, was taken as the maximum amount of CO_2 that should be present in a diver's helmet, instead of the usual 0.04 per cent standard considered in problems of ventilation of houses, ships, etc. It was found that the diver could do fair work at 3 per cent CO_2 , divided by number of atmospheres, absolute pressure, and not suffer from the terrible dyspnea usually experienced by men diving to moderately deep depths, as was the case before the investigation of this subject.

Taking this as a standard, the necessary standard of air supply is figured as follows:

D = Delivery cu. ft. per minute air required

E = No. cu. ft. air expired per minute.

R = Ratio of CO₂ desired.

A. P. = Number of atmospheres absolute pressure.

According to the formula $D = \frac{E}{R}$:

$$D = \frac{0.045}{A. P.} \text{ divided by } \frac{3}{100 \times A. P.}, \text{ or } \frac{0.045}{A. P.} \times \frac{100 \times A. P.}{3}$$

$$D = \frac{4.5}{3} \text{ or } 1.5 \text{ cubic feet per minute.}$$

It must be remembered, however, that this 1.5 cubic feet is measured at the pressure to which the dive is made. Measured at atmospheric pressure in a dive made to 264 feet with $\left(\frac{264}{33}\right)$ or eight atmospheres excess pressure, or nine absolute, it is evident that the air measured at the surface must equal 9×1.5 cubic feet or minimum delivery of 13.5 cubic feet per minute to maintain a standard of 3 per cent CO₂, corresponding to normal conditions.

Better ventilation than this is imperative for hard, useful work in diving. In our work on experimental diving it was found possible to dive with manually operated pumps to depths attained by the English, but deep diving in this manner was not considered practicable.

It is considered that, owing to the limited capacity of manually operated pumps, while diving to moderate depths with efficient tested pumps is practicable, useful diving to excessive depths is not practicable.

A standard of $\frac{1}{\text{no. atmospheres, abs. pressure}}$ per cent CO₂ was proposed; i. e., 4.5 cubic feet of air per minute measured at the absolute pressure. This was found practicable by utilizing air from accumulators, charged or charging by power-driven compressors. In diving by this method to depths up to 255 feet, corresponding to 8.7 atmospheres, absolute pressure, the largest per cent CO₂ present in any of the analyses was 0.1 per cent. Multiplying this by the number of atmospheres of absolute pressure, this corresponds to a CO₂ pressure of 0.87 per cent of an atmosphere, which is considered excellent helmet ventilation for a diver.

In the diving in the experimental diving tank at A. Schrader's Son, Brooklyn, N. Y., the descending air (air used to apply pressure to the surface of the water) and the air utilized to ventilate the diver's helmet were both taken from the same accumulators. These were two large accumulators of low pressure (135 pounds gage).

Air pressure in the accumulators was maintained by two large-capacity, low-pressure, electrically driven and automatically con-

trolled power compressors (running when pressure was below 135 pounds and stopping when accumulators were up to pressure).

The air for the diver was led through an air cooler (circulating water jacket) and through three Navy standard air separators before reaching the diver, the object being to cool the air and remove any oil fumes that might have been carried over from the pumps.

It was found that the air was sufficiently cooled coming from the accumulator, even with both compressors running without the cooler.

The piping from the accumulators was not exceedingly long (50 feet) and only one length of diving hose was used.

Under these conditions it was found that as long as the air pressure to the diver exceeded by 10 or 15 pounds the pressure to depth of which dive was made, sufficient air circulated through the helmet to attain ventilation equal to less than 1 per cent of an atmosphere of CO_2 .

As there was no way of measuring the air supplied to the diver in the experimental diving tank, the only guide to air supply was the diver's well-being, and per cent of CO_2 of the air from the diver's helmet. Air supply was always satisfactory in utilizing air from the accumulators. In ventilating the helmet with hand pumps air supply was not satisfactory at great depths, and the space and number of men required were great.

In the actual diving tests from the U. S. S. *Walke* a slightly different arrangement of air supply was followed. Air was supplied to the diver from a small (2 cubic feet) low-pressure accumulator, reaching this from torpedo (11 cubic feet) air flasks at high pressure, 2,500 pounds to the square inch. A reducing valve was interposed in the piping from the high-pressure accumulator to the low-pressure accumulator.

A high-pressure air compressor discharging into one of the torpedo air flasks was kept going, so that there could be no possibility of failure of air supply. With six torpedo air flasks on the U. S. S. *Walke* it is evident that air for deepest attainable depths for a long period of time could be supplied.

The capacity of the charging pump was rated at 15 cubic feet per hour or one-fourth cubic foot per minute, at 2,500 pounds.

As 2,500 pounds equal 170 atmospheres excess pressure, $\frac{1}{4} \times 171$ equals 42 cubic feet of air measured at atmospheric pressure, rated capacity of pump per minute.

In the record dive from the U. S. S. *Walke* of 274 feet or 8.3 atmospheres excess pressure, it is evident that in furnishing 4.5 cubic feet per minute, or 4.5×9.3 , this equals 41.75 cubic feet. The power compressor would be just about able to supply air for one diver for this depth. In actual experience, however, it was found that more air was used than the compressor supplied.

This was thought to be due to:

A. The compressor not running to its full theoretical capacity.

B. Leaks in the line, as 175 pounds pressure had to be maintained on the low-pressure accumulator.

C. The air coming direct from the compressor was uncomfortably warm, and the diver, thinking it due to CO_2 , took more air than was necessary, or the possibility of a low percentage of CO_2 in the air from the compressor necessitated a greater air supply.

It was found in this dive that a pressure of 50 pounds excess pressure on the low-pressure accumulator was necessary (above the pressure of sea water at depth of dive) to supply necessary air for ventilation of the diver's helmet.

In utilizing air for accumulators the following conditions are necessary:

A. The air in the accumulator must be free from noxious fumes and as near standard purity as possible, i. e., contain as near 0.04 per cent CO_2 as practicable. In utilizing air from high-pressure accumulators it must be remembered that the air in the cylinders of the compressors is greatly heated in charging the accumulators and oil with a high flashing point must be used, castor oil, if possible, so that no flashing in the cylinders will take place, producing CO and CO_2 . If practicable, air analysis should be done.

B. Sufficient pressure in the low-pressure accumulator above the water pressure (depth of dive) must be maintained to insure proper circulation of the helmet. This is estimated between 25 and 50 pounds, according to the depth of the dive.

C. Reserve air supply must always be maintained in case of accident to compressor, etc., to insure a proper stage decompressor for the diver.

DIVER'S PARALYSIS, OR CAISSON DISEASE.

The cause of caisson disease is the liberation of bubbles of nitrogen in the various body tissues upon a decrease of pressure, i. e., ascending too rapidly from deep depths to the surface.

From a study of the gases of the blood and alveolar air it is found that nitrogen is absorbed by the blood mechanically according to the law of partial pressures.

The volume of a given gas dissolved by a liquid varies directly as the pressure (temperature remaining constant).

The oxygen is absorbed by the blood in loose chemical combinations with the proteids. Any increase of oxygen pressure does not increase the amount taken up chemically by the blood. It is found, however, that above the usual one-fifth of an atmosphere exerted by the oxygen extra oxygen is taken up by the blood according to the law of partial pressures.

The CO_2 pressure in the alveolar air, according to Haldane, with proper ventilation is constant (see "Helmet ventilation") and may be stated as about $\frac{5.6}{\text{atmospheres abs. pressure}}$ per cent CO_2 . The

CO₂ absorption by the blood is not well understood. A small amount is in physical solution with the blood but the greatest is held in some loose combination with the proteids, etc. With proper ventilation the CO₂ pressure is constant and does not change, and hence does not enter into the causation of caisson disease.

According to the law of partial pressures, considering the alveolar air as exerting a pressure of 20 per cent and in nitrogen 80 per cent of the total pressure, the volume of each 1,000 c. c. of blood may be figured as follows: The coefficients of absorption of the blood at body temperature are:

Nitrogen.....	0.013
Oxygen.....	0.0262

Considering that the usual alveolar CO₂ percentage of 5.6 becomes proportionately less with increased pressure, we may disregard it and consider that, roughly estimated, in deep depths at least, oxygen equals about 20 per cent alveolar air and nitrogen 80 per cent. According to this calculation the nitrogen in one liter of blood would equal $1,000 \times 0.013 \times 0.80$ equals 10.4 c. c. at atmospheric pressure, or this increase in volume for every atmosphere excess pressure would be 10.4 c. c. \times atmospheres absolute pressure.

The oxygen in solution (physical) $1,000 \times 0.0262 \times 0.20$ equals 5.24 c. c. for each atmosphere of excess pressure of air, i. e., for every atmosphere excess pressure.

One liter of blood contains 5.24 c. c. oxygen measured at atmospheric pressure with every atmosphere excess pressure.

With the use of the Navy type of suit and method of supplying air to the diver it is considered that the oxygen absorption does not enter into the causation of caisson disease; that some of the oxygen is absorbed and utilized by the tissues, and that the oxygen being at one-fourth the partial pressure of the nitrogen it is given off much more rapidly on release of pressure. It is considered that nitrogen is the only gas that enters into the causation of caisson disease under these conditions. Typical lesion bubbles of oxygen in spinal cord of mice have been demonstrated in using a very high oxygen pressure, i. e., pure oxygen gas under high pressure and releasing the pressure suddenly.

The accepted theory of cause of caisson disease is that bubbles of nitrogen are liberated in the various tissues of the body, including the blood. The blood in the lungs being in contact with alveolar air takes up nitrogen in physical solution. The circulation time has been calculated at one minute, hence, the entire blood will be saturated for the partial pressure of nitrogen in one minute.

If the blood were the only tissue of the body to be considered it is evident that saturation and desaturation would take place in one minute. Such is not the case, however. The nitrogen in solution is given off to the various tissues and these, absorbing nitrogen, become

saturated for that pressure after a period of exposure of about four hours (in man). With work, the circulation being increased, saturation takes place much more quickly (less than half the time). The blood of an average man is about 3 liters, or one-twentieth the body weight. In the first minute the blood, becoming immediately saturated, loses 95 per cent of its nitrogen in giving off the super-saturated nitrogen to the tissues. In returning to the lungs again (1 minute circulation) it will be 5 per cent saturated. The second minute, $\frac{5}{100} \times \frac{95}{100}$, or 4.75; and the third minute will add $\frac{5}{100} \times \frac{90.25}{100} = 4.3$, etc. Thus in five minutes the tissues will become saturated at this rate.

$5.0 + 4.75 + 4.5 + 4.3 + 4.1 = 22.65$ per cent saturation of the body in five minutes.

Figuring at this rate, it is estimated that half saturation would take place in about 15 minutes, and the body would be entirely saturated in about one hour. Such is not the case, however. The blood is not equally distributed through the body. The connective tissues, skin, joints, medullated nerve trunks, etc., having a poorer blood supply than muscles, digestive organs, etc., will be the last to become saturated and the last to desaturate after becoming saturated.

It has been estimated that one-half saturation takes place in man in about one hour and total saturation in about four hours, according to Hill, with hard work, in half this time.

With a sudden decrease of pressure (high) to normal it is evident that the nitrogen in solution at low pressure will be immediately liberated, as in the soda-water bottle, and form bubbles. Such is the case with the diver, but the bubbles are formed much more slowly, and it may take some hours to increase in size necessary to cause symptoms.

It is known that nitrogen is five times more soluble in fats than in the other tissues of the body. It is given off more slowly from the fats and this accounts for the spinal cord lesions and lesions in the epiphyses of the bones, causing pains referable to joints in caisson disease. This also accounts for fat men being more predisposed to it.

Desaturation takes place at the same rate as saturation; hence if it takes a man four hours to saturate for a given pressure it will take four hours for him to desaturate.

It has been found that a man can become saturated for one atmosphere excess pressure and have pressure immediately reduced to normal without any ill effects whatsoever. In fact, a little higher pressure than this can be stood; i. e., saturation at 2.3 absolute pressure and decompressed to atmospheric pressure, or a ratio of 2.3 to 1. It is considered that the bubbles of nitrogen that are liberated are so fine as to pass through the finest capillaries and cause no damage or danger to the diver's well-being. On this theory have been

constructed a series of tables, based on what is known as stage decompression (in contrast to slow or uniform decompression); that is, a change of absolute pressure to a reduced pressure, so that absolute pressure will be to this reduced absolute pressure as 2 to 1, or 2.3:1. Example: A diver working at 165 feet, or five atmospheres excess pressure or six atmospheres absolute. According to this theory absolute pressure diminished to 2.6 atmospheres, i. e., 6:2.6, equals 2.3:1.

As we have the atmosphere exerting one atmosphere pressure the diver can be safely brought up to an excess pressure of 1.3 atmospheres, a depth from the surface of 43 feet. Upon this theory there has been constructed an excellent system of tables, the man coming quickly from deep and dangerous pressures to comparatively shallow depths with the various stops at every ten feet.

It has been found that decompression in this manner is far safer after short exposures than a gradual decompression; i. e., going slowly up to a slow pressure. With uniform decompression the diver instead of desaturating continues to absorb more nitrogen for the higher pressures. Decompression tables as practiced by the British Admiralty follow:

TABLE 1.—*Decompression tables (used in the British Navy).—Showing ordinary time limits in deep water; stoppages during ascent.*

Depth.		Pressure in pounds per square inch.	Time under water; i. e., from surface to begin- ning of ascent.	Stoppages in minutes at different depths.						Total time for ascent in min- utes.
Feet.	Fathoms.			60 feet.	50 feet.	40 feet.	30 feet.	20 feet.	10 feet.	
0-36	0-6	0-16	No limit.....							0-1
36-42	6-7	16-18½	Up to 3 hours.....							1-1½
			Over 3 hours.....						5	6
42-48	7-8	18½-21	Up to 1 hour.....							1½
			1 to 3 hours.....						5	6½
			Over 3 hours.....						10	11½
48-54	8-9	21-24	Up to ½ hour.....							2
			½ to 1½ hours.....						5	7
			1½ to 3 hours.....						10	12
			Over 3 hours.....						20	22
54-60	9-10	24-26½	Up to 20 minutes.....							2
			20 minutes to ½ hour.....						5	7
			½ to 1½ hours.....						10	12
			1½ to 3 hours.....					5	15	22
			Over 3 hours.....					10	20	32
60-66	10-11	26½-29½	Up to 15 minutes.....							2
			½ to 1 hour.....						5	7
			1 to 1 hour.....					3	10	15
			1 to 2 hours.....					5	15	22
			2 to 3 hours.....					10	20	32
66-72	11-12	29½-32	Up to 15 minutes.....						2	4
			½ to 1 hour.....					3	5	10
			1 to 1 hour.....					5	12	19
			1 to 2 hours.....					10	20	32
72-78	12-13	32-34½	Up to 20 minutes.....						5	7
			20 to 45 minutes.....					5	15	22
			½ to 1½ hours.....					10	20	32
78-84	13-14	34½-37	Up to 20 minutes.....						5	7
			20 to 45 minutes.....					5	15	22
			½ to 1½ hours.....					10	20	32
84-90	14-15	37-40	Up to 20 minutes.....					3	5	10
			20 to 40 minutes.....					5	15	22
			40 to 60 minutes.....				3	10	15	30
90-96	15-16	40-42½	Up to 20 minutes.....					3	5	11
			20 to 35 minutes.....					5	15	22
			35 to 55 minutes.....				5	10	15	32

TABLE 1.—*Decompression tables (used in the British Navy).—Showing ordinary time limits in deep water; stoppages during ascent—Continued.*

Depth.		Pressure in pounds per square inch.	Time under water; i. e., from surface to beginning of ascent.	Stoppages in minutes at different depths.						Total time for ascent in minutes.
Feet.	Fathoms.			60 feet.	50 feet.	40 feet.	30 feet.	20 feet.	10 feet.	
96-108	16-18	42½-48	Up to 15 minutes.....					3	5	11
			15 to 30 minutes.....				3	7	10	23
			30 to 40 minutes.....				5	10	15	33
108-120	18-20	48-53½	Up to 15 minutes.....				2	3	7	15
			15 to 25 minutes.....				5	5	10	23
			25 to 35 minutes.....				5	10	15	33
120-132	20-22	53½-59	Up to 15 minutes.....				2	5	7	17
			15 to 30 minutes.....				5	10	15	33
132-144	22-24	59-64½	Up to 12 minutes.....				3	5	5	16
			12 to 25 minutes.....			2	5	10	12	32
144-156	24-26	64½-70	Up to 10 minutes.....				3	5	5	16
			10 to 20 minutes.....		2	3	5	8	10	31
156-168	26-28	70-75	Up to 10 minutes.....			2	3	5	5	18
			10 to 16 minutes.....		2	3	5	7	10	30
168-180	28-30	75-80½	Up to 9 minutes.....			2	3	5	5	18
			9 to 14 minutes.....		2	3	5	7	10	30
180-192	30-32	80½-86	Up to 13 minutes.....		2	3	5	7	10	30
192-204	32-34	86-91½	Up to 12 minutes.....	2	2	3	5	7	10	32

TABLE 2.—*Decompression tables (used in the British Navy) showing stoppages during ascent after exceeding the ordinary limits of time on the bottom.*

Depth.		Pressure in pounds per square inch.	Time from leaving surface to beginning of ascent.	Stoppages at different depths in minutes.								Total time for ascent in minutes.
Feet.	Fathoms.			80 ft.	70 ft.	60 ft.	50 ft.	40 ft.	30 ft.	20 ft.	10 ft.	
66	11	29½	Over 3 hours.....							10	30	43
72	12	32	2 to 3 hours.....							10	30	43
			Over 3 hours.....							20	30	53
78	13	34½	1½ to 2½ hours.....							20	30	53
			Over 2½ hours.....							30	30	62
84	14	37	1½ to 2 hours.....							15	30	47
			2 to 3 hours.....						5	30	30	67
			Over 3 hours.....						10	30	35	77
90	15	40	1 to 1½ hours.....						5	15	25	47
			1½ to 2½ hours.....						5	30	30	67
			Over 2½ hours.....						20	35	35	92
96	16	42½	55 minutes to 1½ hours.....						5	15	30	52
			1½ to 2½ hours.....						10	30	35	77
			Over 2½ hours.....						30	35	35	102
108	18	48	40 minutes to 1 hour.....						10	15	20	43
			1 to 2 hours.....					5	15	25	35	83
			Over 2 hours.....					15	30	35	40	122
120	20	53½	35 minutes to 1 hour.....					5	10	15	25	57
			1 to 2 hours.....					10	20	30	35	97
			Over 2 hours.....					30	35	35	40	142
132	22	59	½ to 1 hour.....					5	10	15	20	53
			1 to 1½ hours.....					5	10	20	30	98
			Over 1½ hours.....				15	30	35	40	40	163
144	24	64½	25 minutes to 1 hour.....				3	5	10	15	25	61
			1 to 1½ hours.....				10	10	20	30	35	108
			Over 1½ hours.....				30	30	35	40	40	178
156	26	70	20 to 35 minutes.....				3	5	10	15	20	56
			35 minutes to 1 hour.....				7	10	15	30	30	95
			Over 1 hour.....			20	25	30	35	40	40	193
168	28	75	16 to 30 minutes.....				3	5	10	15	20	56
			30 minutes to 1 hour.....			3	10	10	15	30	30	101
			Over 1 hour.....		5	25	25	30	35	40	40	203
180	30	80½	14 to 20 minutes.....				3	3	7	10	15	41
			20 to 30 minutes.....			2	2	3	10	15	25	60
			30 minutes to 1 hour.....		3	3	7	10	20	30	35	111
			Over 1 hour.....		15	25	30	30	35	40	40	218
192	32	86	13 to 20 minutes.....				3	3	7	15	15	46
			20 to 30 minutes.....				3	3	5	10	15	64
			30 minutes to 1 hour.....			3	5	10	12	20	30	118
			Over 1 hour.....		5	20	25	30	30	35	40	228
204	34	91½	12 to 20 minutes.....				3	3	5	7	10	51
			20 to 30 minutes.....				3	3	5	10	20	67
			30 minutes to 1 hour.....		3	3	5	10	15	20	30	124
			Over 1 hour.....		15	20	25	30	30	35	40	238

These tables were constructed and proved by careful animal experimentation by Haldane. While they are not guaranteed to protect from a slight or moderate attack of the "bends," a diver compressed according to them will be saved from any serious attack of caisson disease. It is recommended that they be incorporated in the new Diving Manual.

After complete saturation stage decompression becomes less efficient, and it is questionable whether uniform or stage decompression has the greater advantage. With short exposures, however, stage decompression is safer. But it is simply a question of time allowance in either case.

It is evident that these tables consume a large part of the time in shallow water. As there is one increase in volume of gas from 33 feet to the surface it is evident that these protracted stays are most essential, as the danger point of large bubble formation is doubled.

It is evident that if a diver saturates and desaturates at the same rate, decompression will be in proportion to compression and length of exposure to high pressure. Hence, in deep diving it is to the diver's advantage to descend as quickly as possible, limit his stay to as short a time as possible, and then hurry out to his first stage of decompression. Some of the divers engaged in these tests have taken a pressure equal to 212 feet in from 40 to 60 seconds.

In all our diving tests the decompression tables as recommended by the British Admiralty were followed and in deep depths tables on the same theory for the increased depths utilized.

No symptoms of the mildest case of caisson disease were noted. It might be stated that no dives longer than 30 minutes were made at extremely high exposures, and the diver was usually at rest. On two occasions, however, by hurrying out too rapidly mild cases of the "bends" were experienced. In both instances the first thing that was observed was a burning dermatitis (sand hog's itch) over the entire body, due to nitrogen bubbles in the skin and subcutaneous tissues, followed in a few hours by twinges of pain in the various joints.

Under the usual conditions decompression cannot be hurried with safety. Muscular exercise increases circulation and hurries desaturation. This is necessary and is taken into account in the construction of the tables.

By decreasing the partial nitrogen pressure in the diver's helmet and by supplying oxygen to the diver we hasten desaturation greatly, and this could be used very advantageously in shallow depths. It must be remembered, however, that moderate oxygen pressures are dangerous and, if high, will cause death quickly from oxygen poisoning. Two hundred per cent oxygen pressure is risky, increasing with length of exposure, and 300 per cent extremely dangerous for any length of stay, however short. (See "Oxygen poisoning.")

As oxygen and nitrogen pressure increases proportionately with depth, it is evident that in using air at 10 atmospheres absolute pressure we will have oxygen exerting 200 per cent of an atmosphere and nitrogen 800 per cent of an atmosphere.

Nitrogen is absorbed in increasing amounts and predisposes to caisson disease, necessitating a longer decompression.

If it were possible to introduce some diluting inert gas to decrease the partial pressure of oxygen and nitrogen, it is evident that greater depths, with safety from oxygen poisoning, could be attained, and at the same time the partial pressure of nitrogen would be diminished. Absorption of nitrogen by the body, with consequent danger of caisson disease, would be lessened, and a shorter decompression period in proportion to the nitrogen saturated could be established.

Now that diving with use of high-pressure accumulators has proved practicable, if air diluted with some inert gas could be supplied the diver in place of air, i. e., as hydrogen and air, both conditions would be met. This is a new field suggested but would necessitate a larger amount of animal experimentation before its practical use could be determined.

It is evident from the preceding that the only effective treatment for caisson disease would be immediate recompression. In all caisson work medical air locks, or recompression chambers, are installed in connection with the work for this purpose.

In the experimental diving from the U. S. S. *Walke* a recompression chamber was installed and air supply from a torpedo air flask was utilized. It was found that one flask would charge the chamber to 100 pounds in less than three minutes. The chamber was installed with medical means for treating any case of caisson disease that might occur, especially with the possibility of accidental "blowing up." Fortunately, no such cases occurred. In all cases of deep-diving operations it is considered that a compression chamber of some sort is essential, as there are no efficient means of treating bad cases of caisson disease without one. Immediate recompression usually alleviates all symptoms. If some time has elapsed after onset of the attack, however, while it may help, it is not as efficacious as immediate compression at onset of symptoms.

EFFECTS OF OXYGEN PRESSURE.

Paul Bert, in his experiments on the cause of death of animals inclosed in a small space, found that—

1. At pressures inferior to 1 atmosphere, when the CO_2 is absorbed by potassium hydrate, sparrows live until the partial pressure of oxygen sinks to 3.6 per cent of an atmosphere.

2. In air compressed to 2 to 9 atmospheres and superoxygenated to prevent want of oxygen, they die when the pressure of CO_2 equals 26 per cent of an atmosphere.

3. In higher pressures death is caused by the pressure of oxygen, and rapidly when this equals 300 to 400 per cent.

4. In pressures of 1 to 2 atmospheres death is due partly to fall of oxygen pressure and partly to increase of CO_2 .

In pressures of 3 to 4 atmospheres of air the poisonous effects of oxygen begin to appear after long exposures.

Air composed of 20 per cent oxygen exerts one-fifth of an atmosphere oxygen pressure. At 10 atmospheres' pressure, the oxygen being one-fifth, would exert 2 atmospheres of oxygen pressure. Hence 2, 3, 4 atmospheres of oxygen pressure would equal 10, 15, and 20 atmospheres of air.

The experiments of Bert were carefully worked out by Smith and Hill, and these investigators found that exposure of animals to a pressure of 170 to 180 per cent of an atmosphere of oxygen caused, in a short time, diminution in the power of the lungs to absorb oxygen. The tissues of the lungs showed intense congestion and an exudate into the alveolæ.

According to Hill, high partial pressure of oxygen produces a marked irritant effect on the lungs, producing first congestion and shortly afterward hemorrhagic exudation and consolidation, i. e., a typical pneumonia. The pneumonia is patchy, if quickly developed, and general if slowly developed.

According to Smith it requires about 24 hours' exposure at plus 7 atmospheres of air or 168 per cent atmospheres of oxygen to produce marked symptoms of pulmonary congestion.

Experiments on monkeys showed no lung trouble in sequent exposures every day for four or five hours at a time.

With exposures to oxygen pressure of 300 to 400 per cent, symptoms of oxygen poisoning quickly intervene, and, in addition to the lung irritation, convulsions tetanic in character may occur.

In most types of self-contained diving and submarine escape apparatus, oxygen is used in addition to air. It is evident from the above that their construction and use will depend on the findings of Bert.

The simplest type of self-contained apparatus is the usual mine rescue apparatus. This is constructed for work in one atmosphere, and the question of oxygen poisoning does not enter. The question of deficient oxygen pressure and CO_2 does often enter.

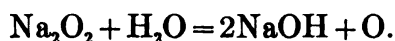
This apparatus is constructed so that oxygen is supplied from a small high-pressure accumulator, usually at the rate of 2.5 liters per minute. Air expired is forced through a chamber or cartridge containing caustic soda (solid), which removes most of the CO_2 . A small canvas sack acts as a low-pressure accumulator, and the air is rebreathed, but oxygen is constantly being supplied at the rate of 2.5 liters a minute, the high-pressure accumulator holding about one hour's supply of oxygen. With failure of oxygen supply with this

type of apparatus it is evident that with CO_2 removed and oxygen diminished, in partial pressure it would not be long before effects of diminished oxygen pressure became manifest. Such is the case, and men often become unconscious in these suits before they realize that anything is wrong.

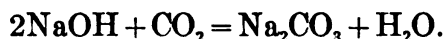
It has been found in the use of these suits that more than 2.5 liters of oxygen per minute are utilized in hard work. While a man may sit and move around slowly in this apparatus, when it comes to walking and doing moderately hard work his oxygen supply is entirely too little, and unless he sits quietly he will become unconscious and be in danger of losing his life. The country has been flooded with a great many of these outfits, which, on being put to a real test, have proved absolutely useless, and there are many instances where men have lost their lives in their use.

Siebe-Gorman, in their construction of mine rescue apparatus, in work for fire fighting, found that it was necessary to supply 3 liters of oxygen per minute to permit a man to climb a ladder.

Another type of apparatus similar to this type has been constructed. Instead of oxygen being supplied by an accumulator it is supplied by decomposition of fused sodium peroxid.



Moisture from the expired air usually is used in liberation of oxygen and the resulting NaOH absorbs the CO_2 .



It is evident that both these types of apparatus depend entirely on sufficient removal of CO_2 from the expired air and sufficient supply of oxygen.

Breathing with these types is usually through a mouthpiece and necessitates practice in use.

These principles have been applied to diving apparatus and submarine escape apparatus. It is known as the noninjector type in contradistinction to the injector type. The noninjector type (Siebe-Gorman) was tried in our experiments. Instead of using pure oxygen a 50 per cent mixture of oxygen and nitrogen was used and the apparatus limited to diving to 66 and 70 feet of water, i. e., $\frac{50}{100} \times 1$ plus $\frac{66}{33} = 150$ per cent atmospheres oxygen pressure, which is considered a safe oxygen pressure for fairly long exposures.

In this apparatus oxygen mixture was supplied at the rate of five liters a minute. In addition there is a special valve arrangement for inflating the suit sufficiently to prevent squeeze in descending.

In the Siebe-Gorman injector type of apparatus the diver expired into the helmet directly and arrangement was made for supplying

oxygen mixture to the helmet and at the same time sucking air from the helmet through a cartridge of sodium hydrate back to the helmet. In this type a 50 per cent mixture of oxygen and nitrogen is used and the suit limited to depths of 60 to 70 feet, or an oxygen pressure of 150 per cent atmospheres.

A Draeger injector type of apparatus was also tried. This differed from the Siebe-Gorman type in that descent was made by using air from a small high-pressure accumulator and pure oxygen supplied at the rate of 2.5 liters per minute. The suit was supposed to be good to depths of 200 feet and good for one hour's submersion.

Analysis of air in this type showed as high as 60 per cent of oxygen with varying percentages of CO_2 . It is evident from this analysis that the suit could not be safely used in deep depths on account of the dangers of oxygen poisoning.

In the practical use of all these suits it was found that diving to depths of 60 to 70 feet could be done as readily as with the ordinary diving apparatus, provided that the diver was at rest. When work was attempted, however, it was found that even moderate work could not be done without great respiratory distress.

Analysis of air showed varying percentages of CO_2 , up to 4 per cent. Oxygen was always present in sufficient quantities, averaging about 40 per cent.

The use of these suits was not deemed practicable for the following reasons:

1. Their construction is complicated and they easily get out of order.
2. They are limited to moderate depths on account of danger of oxygen poisoning and CO_2 accumulation.
3. The air supply is limited to about one hour, and in case of fouling would mean death to the diver unless he were quickly cleared.
4. Hard work was not practicable on account of respiratory distress.
5. The superiority of diving with the use of air from hand-operated diving pumps or air accumulators (surface) was shown.

PHYSICAL STANDARD OF DIVERS.

In recruiting the Navy, men of high physical standard are chosen, i. e., men free from disease, with ears, heart, lungs, kidneys, and blood vessels normal, and men of good muscular development. It has been found that there are two other elements that enter into the selection of men for deep diving, viz: 1, degree of fatness; 2, age.

Hill, in a careful course of animal experimentation and a study of the statistics of caisson workers, found that men of moderate robustness and men at or past middle age were more disposed to caisson disease than were the young, or the slim, small, wiry men.

From his experiments he is of the opinion that the fact most concerned is the amount of fat. This is explained by the fact that nitrogen is five times more soluble in the fats, and that it is given off more slowly; hence the predisposition to caisson disease.

Men of middle age are more inclined to fatness, and therefore more predisposed to caisson disease. The respiratory exchange in middle-aged men is slower, and in moderately fat men the blood, instead of being one-twentieth of the body weight, is nearer one-thirtieth, and hence elimination of nitrogen in solution of body tissues would be slower, i. e., a proportion of 20:30 in slim young men as compared with moderately fat men.

Arteriosclerosis is considered a dangerous factor and men with even slight arteriosclerosis should not be chosen for this work.

Ear disease is considered a bar against diving, especially any trouble interfering with the patulousness of the eustachian tubes. It was found in our work that oftentimes men with a slight cold and congestion of the eustachian tubes were not able to clear their ears, i. e., equalize the pressure within the eustachian tubes and the external pressure on the drums. The pain from excessive pressure on the drum is severe. Fortunately, the hardest part of the dive, in this respect, is the first 30 feet. If a diver makes his first 30 feet he will be troubled little in this respect, irrespective of the depth beyond.

If a man is suffering from coryza it is better to select another diver, as he will be able to descend much more quickly, and therefore lessen his exposure to high pressure and his liability to caisson disease.

As air pressures beyond three or four atmospheres have an irritant effect on the lungs it is evident that the diver's lungs must be sound and no latent foci of tuberculosis present.

It is considered that the best type of man for deep diving is the young (20 to 30), short, thin, wiry man. Circulation is faster in their case and they desaturate more quickly and are less inclined to caisson disease.

PREVENTION OF ACCIDENTS.

Diving as practised at present in our Navy is a dangerous undertaking. Accidents are constantly occurring, even in diving to moderate depths.

From careful study of the accidents occurring it is found that the cause of most are as follows:

- A. Lack of knowledge.
- B. Insufficient training.
- C. Defective apparatus.
- D. Carelessness.
- E. Insufficient care in selection of men.

Heretofore the diving manual issued for instruction of divers has been a most rudimentary affair and it does not include the real scien-

tific facts relative to diving. It is considered that the first step to remedy this defect is the publication of a new, up-to-date, diving manual, and the supplying of it to officers and men, who may, at any time, become connected with any diving operations. Gunner G. D. Stillson, United States Navy, has already received orders to prepare a new diving manual and this will appear in a short while.

It is considered that the course of instruction in diving at the various Navy diving schools is insufficient and does not fit men for diving with safety, especially in moderately deep depths. This is a defect that can easily be remedied as follows:

(a) The installation of diving tanks similar to the experimental diving tank used at A. Schrader Son's; (b) the instruction of men in diving in these tanks, using hand pumps in series and air from air accumulators (high and low pressure); (c) all men to qualify in tank diving to depths of 170 feet for 15 minutes; (d) after the completion of the course in tank diving a course of instruction in actual diving, tending, etc., in open water; (e) all men to qualify in depths of 150 feet for 15 minutes before being graduated as qualified divers; (f) the course to include a thorough instruction of the diving apparatus, the function of the various parts, methods of testing, etc.

The present type of diving apparatus is considered defective in many ways. This subject has already been discussed and the improved type of apparatus recommended. It is also recommended that no more of the present type of diving apparatus be purchased. Specifications for the new type are being prepared and authority to purchase outfits of this type has been granted.

This does not mean that the subject of efficient apparatus is entirely solved. All diving apparatus is constantly deteriorating and imperfections from use and disuse are constantly occurring.

The maintaining of efficient apparatus is in proportion to the care it receives.

In all diving operations it is essential to test the apparatus just before using to be sure of its efficiency.

With the improved method of diving the simplicity and confidence in the newer method often leads to a disregard of safeguards, and an inclination to recklessness and carelessness on the part of men who do not realize the seriousness of the undertaking.

Tenders are apt to be negligent, and as a result accidents are likely to occur.

Diving is a serious undertaking and should be so considered. Caution and attention should always be observed on the part of all connected with the operations.

Heretofore diving in the Navy has practically been restricted to depths of 60 or 70 feet. In diving to this depth the ordinary physical standard as required was sufficient; that is, if a man was physically sound and strong he was considered suitable for diving.

In deep diving the question of a more careful selection on account of liability to caisson disease is to be considered.

A careful examination by the medical officer is essential. This examination should be made at regular intervals.

A safe plan of procedure is to have the medical officer examine all men detailed for the work before the diving is undertaken.

ACCIDENTS.

The accidents usually encountered in diving operations are:

1. Asphyxia.
2. Squeeze.
3. Caisson disease.
4. Accidental "blowing up."
5. Fouling.
6. Ear pains (bleeding from ears).
7. Bleeding from the lungs and nose.
8. Mechanical injuries from external violence.
9. Exhaustion.
10. Drowning.
11. Oxygen poisoning.

Asphyxia: This is usually the result of insufficiency or failure of air supply. This has already been discussed and needs no further comment.

Squeeze: In cases of slight squeeze, as with the regulating escape valve open wide and a minimum air supply, the air within the air passages is at a lower pressure than the pressure without, and the diver is forced to breathe against this extra pressure. Respiratory embarrassment results in a short while, and often a diver struggling up his descending line, buoyance being negative, under these conditions may bleed considerably from the lungs and nose. Hemorrhage in this case is usually due to rupture of small lung capillaries.

Squeeze is usually the result of an accidental fall. This has already been explained. It may occur from other causes, however:

1. A diver descending ahead of his air supply; i. e., descending before the pressure within the suit is equal to the water pressure without.
2. Failure of air supply and a leaky inlet valve (check).
3. Ruptured cuff of dress and the diver throwing his hand up over his head. (Squeeze in this case being slight but enough to interfere with respiration.)

N. B.—The tender should always have a tight hold on the diver's lines to prevent his falling.

Caisson disease: This has been explained. Its prevention consists of:

1. Limiting time of exposure to high pressures.

2. Proper stage decompression.

3. Proper physical standard in selection of divers.

Accidental blowing up: This may be injurious in various ways, as:

From deep depths an acute attack of caisson disease may result, or from any depth the danger of striking some floating object, as ship's side, etc., with resulting mechanical injury.

This is caused by overinflation of dress, or the drag of tide on the lines, etc., sweeping the diver to the surface.

Fouling: Lines become entangled in working about wrecks and prevent the diver from ascending. This usually requires another diver's going down and clearing the one fouled.

Divers should be instructed in this respect. Deaths have resulted with men fouled and unable to ascend.

Ear pains: These are due to inequalities of pressure on the sides of the drums, usually due to inexperience, the diver not knowing how to "clear his ears." Cases have been recorded where pressure (external) has been sufficient to rupture the drums and cause bleeding.

Mechanical injuries from external violence: These are of many varieties and call for no special comment.

Exhaustion: Deaths from exhaustion in diving have occurred.

Drowning: Two cases on record of drowning have occurred. In both instances the helmet became detached from the suit. It is a common superstition among divers that if the dress ruptures drowning results. Such is not the case. The dress is not an essential part of the apparatus. Diving with helmets secured to the body has been done in depths to 140 feet as readily as with the dress and helmet.

As long as air pressure within the helmet is maintained water can not enter and the diver will not drown. By simply closing the escape valve air is forced down into the suit and will escape at the site of the rent.

Oxygen poisoning: There are no recorded cases. With the usual method of diving sufficient depths of long enough periods of time have not been attained to cause this effect.

On using self-contained diving apparatus and submarine-escape apparatus this question has an important bearing and has been considered.

TUBERCULOSIS.

By E. THOMPSON, Surgeon, United States Navy.

During the past year there were 474 cases of tuberculosis reported in the Navy. This number does not include readmissions. More than one-tenth of the total sick days were caused by the various forms of tuberculosis. With this record tuberculosis pushes to the

front as a most important disease. The number of sick days incident to tuberculosis of the lungs alone is more than those of any other disease or injury. The consolidated sick days of the three diseases incident to social evil are more than those of tuberculosis. The disabilities of the former are, however, of less importance than the latter as the percentage of cures is much greater and the danger of immediate extension is prevented by treatment, quarantine, and other measures.

The diseases of the social state are acquired, more or less, in a voluntary manner. They can be said to have been a part of a contract. This is not true of tuberculosis, for here we have a disease which is imposed on a person who does not wish nor in any way seek it. He becomes a victim through no act of his own.

No person enters the Navy except when found qualified by a searching physical examination. The rejections far outnumber those passed in. It is a fact that many are called, but few are chosen. The personnel is hand-picked physically. The single rule that there must be a specific weight for a certain height probably causes the rejection of a great number of men with incipient and unrecognized tuberculosis.

Yet in spite of this enforced selection that should place the Navy in a high expectancy class, the fact that so many cases of tuberculosis occur is alarming. It means that under favored circumstances, as far as selection of individuals is concerned, tuberculosis still stalks as a white plague. It means that most of these cases are infected after their entrance into the Navy. It means that the disease is acquired in spite of the precautions, rules, and regulations which are in force and practiced to prevent it. It means that the great white plague has not yet been mastered nor entirely controlled in a highly organized body of only 65,000 men. If such a situation exists in a military organization where each individual is subjected to constant scrutiny and care, where unusual means are taken to promote and preserve health, where early and accurate diagnosis is made, and where correct statistics are kept, it can only mean that the tuberculosis problem in the general public must be one of overwhelming importance.

The converted damage in the Navy caused by tuberculosis during the past year was 244. This is computed by the method devised by Medical Director Gatewood. In other words, it means that the damage caused by tuberculosis would be the equivalent of 244 men sick every day in the year. In loss of service and efficiency it amounts to the entire crew of a medium-sized gunboat.

It must be admitted that there are features of ship life in the Navy that are unavoidably favorable for the spread of tuberculosis. These are mainly physical, and first and foremost stands out the

fact that every person on a man-of-war is in constant and close physical contact with his hundreds of associates. On a battleship space is limited and any one person has very little room he can call his own. The peaceful inhabitants of an average cemetery have more elbow room than the crew of a battleship. One who has lived in or observed a town of 1,000 souls knows that the population will be spread over an area of many acres. Yet in the Navy 1,000 men live, year in and year out, on a single ship. This ship is generally warm, with some sudden changes in temperature. The air is moist, ventilation is artificial, and the presence of high-speed air currents can not be entirely eliminated. Consequently there are drafts from one part of the ship to other parts. Direct sunlight does not reach the living spaces. The crew of a battleship are troglodytes.

So when all the circumstances are known it is not surprising after all that tuberculosis is a real problem in the Navy. The disease is incident to the character of the life. Assuming the presence of one or more early yet active cases, all the conditions are favorable for making them highly dangerous. It is doubtful if tuberculosis could be more readily disseminated anywhere than by an active agent coughing all night in a small, moisture-laden space where a large number of his fellows are sleeping in close formation. An officer who has recently been under treatment at the Washington Hospital gives as information that he was the sixth member of a mess on a sea-going ship that had contracted tuberculosis. This is too large a number to be a coincidence, especially as all the officers were selected physically and had been in prior perfect health.

In the Navy an active case of tuberculosis is considered such a menace that a number of regulations and instructions have been promulgated directing the carrying out of certain measures in order that the chances for dissemination will thereby be limited. These rules have to do with the methods of isolation; care of food; sterilization of dishes, clothing, etc.; disinfection and terminal fumigation.

A vital necessity is the removal of a case from a ship at the first possible opportunity after a diagnosis has been made. To delay in this has come to be a reprehensible act. The removal to a hospital is for the good of the patient and the crew of the ship. A "lunger" on a battleship rapidly deteriorates and is at all times a dangerous man, spreading bacilli under favorable circumstances for their growth.

An individual with tuberculosis becomes a marked man only after a diagnosis has been made. This raises the matter of diagnosis to a place of greatest importance. Incipient and unsuspected cases do the greatest damage. Therefore early diagnosis, with an emphasis on the word "early," is the real secret in the prevention of tuberculosis. Early diagnosis presents many and great difficulties, on

account of the insidious nature of the disease and because physical diagnosis is more or less crude for fine work. It is probably true that most cases of tuberculosis are firmly in the embrace of the disease before a diagnosis is made; the benefits of early treatment and the prophylactic effect of early supervision being lost.

Most tubercular men in the Navy report for treatment only after they find that they become easily tired and do not understand why. An examination is then made and there may not be any physical signs. If suspicion is directed to tuberculosis as a possibility and the temperature is taken at hourly intervals for the entire 24 hours of a day, a very characteristic curve will be platted. The fever may be slight—not more than a half degree. But what should have great weight in diagnosis is the fact that the temperature will slump to a point below normal several times during the 24 hours. An erratic temperature playing hide and seek about the normal line is true of tuberculosis alone. At this time bacilli may be found in the sputum and they may not. It is regretted that no positive diagnosis is made until the specific bacilli are found in numbers in the sputum. The presence of bacilli in the sputum is not a primary sign of disease, as the organisms can not be thrown off in numbers until tubercles have broken down. Of course a patient with tuberculosis is not a dangerous focus until he does begin to shed bacilli, but the important point is that he does not come under observation until a period has elapsed since the bacilli began to appear. In incipient cases with small and isolated lesions the bacilli may not be constant and may be missed for a time.

With the recognition of the importance of early diagnosis efforts have been directed to the refinement of diagnostic methods and to the search for special signs which might aid in the formation of a correct and early decision. At the outset an almost fatal difficulty is encountered in the fact that there is no standard. There is no fixed normal to which the findings of the condition of any one case can be compared. This lack of a standard causes increasing difficulty as the methods of examination are refined in order to get at minute changes in palpation, auscultation, percussion, etc. The question of what is normal becomes more important than what is abnormal. In any one case the varying pressure of the bell of a stethoscope on the surface of the body gives entirely different sounds. The change in body tension or blood pressure of the examiner introduces a personal equation which has no relation to the physical condition of the patient. No one can deliver a series of percussion blows that are the same in force and momentum. Only one person in many has "positive pitch" with the ability to compare minute changes in tones. Even these few are helpless in comparing plain at have no regular periodic vibration. In fact the largest

Thompson—Tuberculosis.

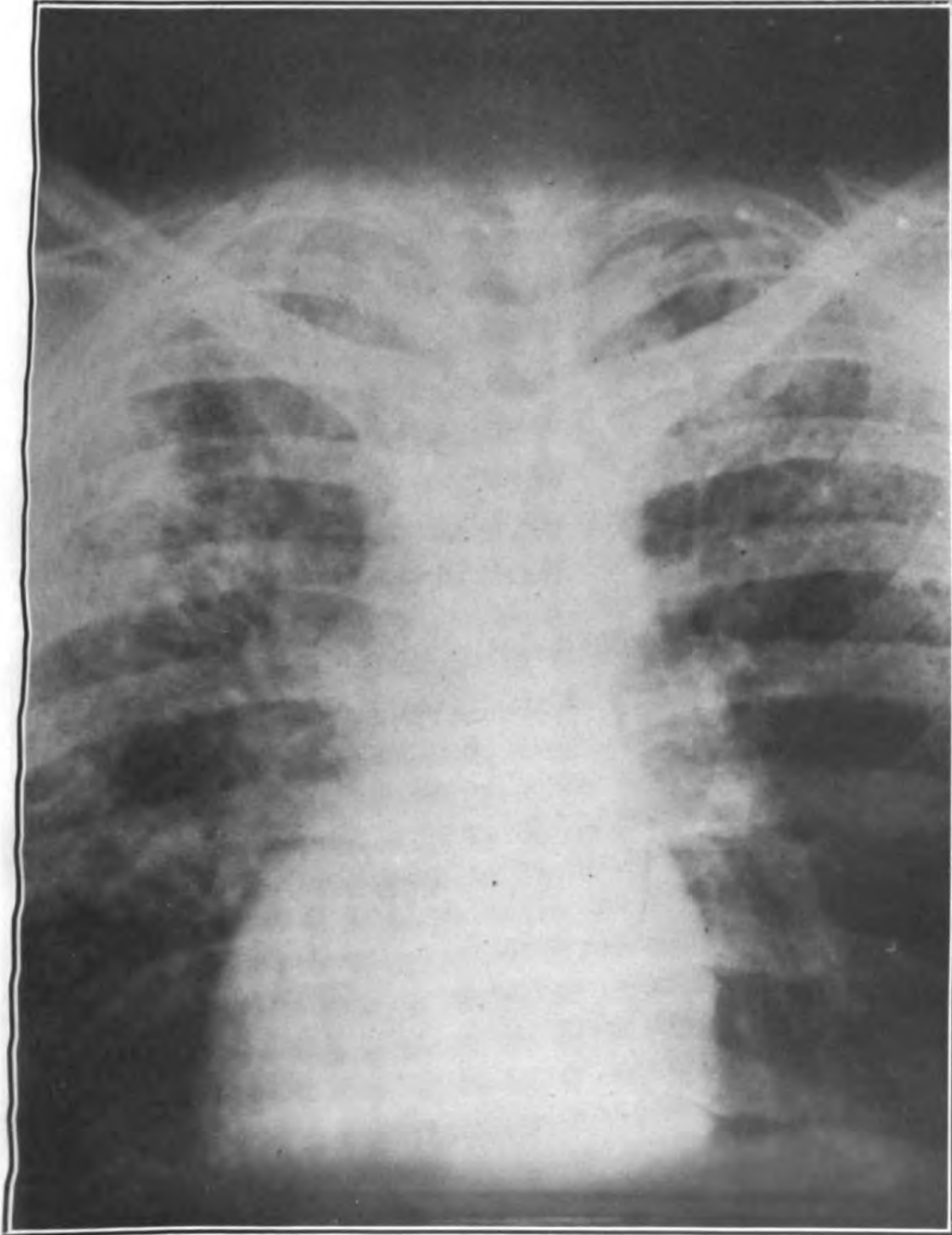


FIG. 1.—FOR DESCRIPTION SEE TEXT.

Thompson—Tuberculosis.

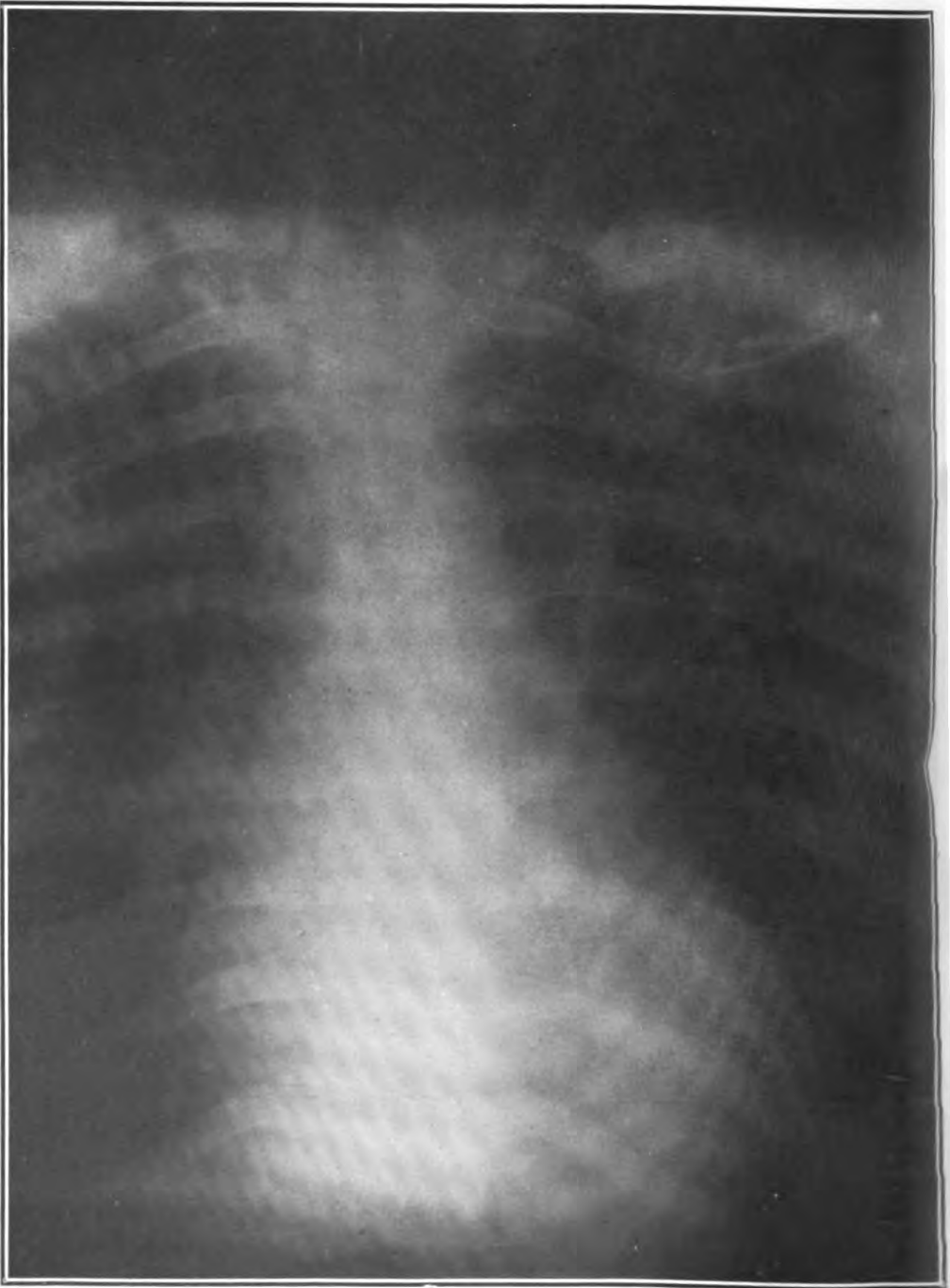


FIG. 4.—FOR DESCRIPTION SEE TEXT.

steps toward the early diagnosis of tuberculosis have been made in the close study of the whispered voice, which is a noise with no definite tone. A tuberculosis infection starts from a normal condition and progresses by minute changes through a more or less extended period of time. When undoubted physical changes can be determined the disease is well on its way, the period of invasion having long since passed.

The X-ray has become a valuable aid in diagnosis but has not fulfilled expectations as far as the determination of early tuberculosis is concerned. The same absence of a normal standard is experienced as in physical diagnosis; also the fact that 80 per cent of all lungs that are examined postmortem show evidences of past or present tubercular lesions would seem to be a serious defect and confusion in X-ray work, because the plate will reveal the projection of all changes in density from all causes, past or present. The permanent marks left by past attacks of pneumonia, bronchitis, asthma, and other diseases are all faithfully recorded, not by any characteristic sign, but only as variations in density telescoped on to a flat surface. The carbon and mineral dust fixed in all lungs leave their signatures on the plate. By stereo-examination the relative position of changes in density can be resolved to some extent, but their character will remain undetermined. In one way the X-ray may be too accurate in that it reveals minute changes in quantity, with a defect that quality is undetermined.

In the reading of lung plates too much is left to interpretation. A brilliant imagination is as important as acute vision.

Some progress has been made, however, the most important being the definite conclusion that the blood content of the lung is the most important factor in the picture. The high atomic weight of the blood, due to its iron, renders it quite impervious to the X-ray. To see that this is true it is only necessary to observe how prominently the arch of the aorta stands out on the plate. Next to blood vessels, in importance, are lymphatic and connective tissues.

In the examination of lung plates for the early diagnosis of tuberculosis, the work can be separated into three logical divisions. These are (a) the general inspection, (b) the examination of the lung roots, and (c) the examination of the lower part of the trachea and the region of its primary bifurcation.

The general examination of the plate as a whole is the most important. This is, unfortunately, difficult, because the eye can not take in the entire surface of a plate with any single retinal image. This trouble can be largely overcome by viewing the plate through a double concave lens, which will reduce the picture to a size that can be seen as a whole by a single visual region on the retina. When a plate is thus viewed, the increase in detail is surprising and seems paradoxical. The increased clearness is no doubt due to the elimi-

nation of the "grain" due to the physical properties of the emulsion of the plate.

A lung picture can conveniently fall into one of three descriptive groups. These groups may be called the three "M's"—marbled, mottled, and misty. The marbled appearance is the nearest to normal. It is the arborization or treelike effect caused by the vessels radiating from the hilus and dividing and subdividing as they spread outward. In a normal picture the branches and network should diminish in size in a regular manner. Any increase in size in the finer branches is abnormal and shifts the appearance into the mottled class, when the tree has a lumpy look. Plate 3 belongs to the mottled group. This is a case in which the clinical diagnosis was positive, but which now has no physical signs except an irregular temperature tending to subnormal. Both apices and the right base have the mottled appearance. This is probably due to permanent masses of lymphatic and connective tissue carrying a certain percentage of lime. The general capillary congestion has receded, and the regions do not have a misty look, as does plate 1, which is a picture of a very rapid and acute case. Two months ago this man was apparently well. The progress has been so fast that the outlines of what appear to be two cavities can be seen in the apex of the right lung. This misty or lace-curtain appearance is the best sign of beginning tuberculosis, especially if it is seen in isolated patches that do not seem to have any connection with the branching network of the tree. A mottled effect indicates improvement. The mottled appearance is common in fibrous cases, such as plate 2, which is a case of ten years' duration with emphysema and a pendulous heart. In this case both apices are about obliterated.

The case represented in plate 4 is one that was quite advanced about a year ago, but has been halted and now has no physical signs.

In a fairly normal plate the primary branches of the hilus should be easily made out—three on the right and two on the left. In a stereo-roentgenogram the branching can be readily seen. In most cases of tuberculosis the branching is blurred by irregular condensations that cast a confusing shadow. Care should be taken to recognize blood vessels and bronchi seen in optical section, which appear on the plate as light and dark spots generally quite circular and sharp in outline. In plate 3 an optical section of a vessel and bronchus can be seen. They lie close together on the right side between the upper and middle branches of the root.

There are a number of methods of examination which give great aid to the early diagnosis of tuberculosis. They are (a) the use of tuberculin; (b) the study of the whispered voice, especially when spoken on inspiration; (c) the search for small moist spots in the lung; (d) the testing of the elasticity of the lung. These are worth special description at some future date.

OBSERVATIONS ON SEVEN CASES OF CEREBROSPINAL FEVER.

By D. C. CATHER, Passed Assistant Surgeon, United States Navy.

The seven cases outlined in this report comprise the total number of cases of cerebrospinal fever occurring on this station for the period of the calendar year 1914.¹ They are a direct continuation of the cases reported in the January (1914) number of the Naval Medical Bulletin by Passed Asst. Surg. G. F. Cottle, United States Navy, and so constitute a complete record of the cases occurring on this station since it was opened in July, 1911, to date.

Six of the cases occurred between January 1, 1914, and April 21, 1914. During this time we were not without one and sometimes two cases on the sick list. The seventh (G—) was admitted October 26, 1914, and was returned to duty December 8, 1914.

Case No. 1 (L—).—This case was not seen by the writer when he was first taken sick, but the writer did administer the fourth dose of serum. Patient was discharged to duty about one month later with no sequelæ.

Case No. 2 (B—).—Admitted January 5, 1914. Chief symptoms were mental dullness, intense occipital headache, stiffness of the neck muscles, Kernig's sign, and irregular pulse rate. Spinal puncture revealed cloudy spinal fluid, a smear from which showed numerous meningococci. Four doses of antimeningitic serum on as many days. Patient was sent to duty February 13, 1914, without sequelæ of any kind.

Case No. 3 (S—).—Admitted February 17, 1914. Headache and mental dullness the most prominent symptoms. Stiffness of the neck muscles pronounced. Kernig's sign rather doubtful. Spinal fluid cloudy and contained many meningococci. Negative for the meningococci after the first dose of serum. Four successive doses of the serum given. Returned to duty April 10, 1914, without sequelæ of any kind.

Case No. 4 (P—).—Admitted March 7, 1914. Headache and restlessness the chief symptoms. Mental dullness slight. Stiffness of the neck muscles present but not pronounced. Kernig doubtful. Pulse rate 112. Mental dullness and stiffness of the neck muscles marked the next morning. Pulse rate dropped to around 84 shortly after the first dose of serum and remained stationary thereafter. Spinal fluid cloudy and contained numerous meningococci. No cocci found after the first dose of serum. Four doses of the serum given on successive days. Returned to duty May 5, 1914, without sequelæ of any kind. This patient during the course of the disease manifested severe motor symptoms, so much so that it was thought advisable to notify his parents that they should expect some paralysis following his recovery from the disease. This patient was seen

¹ Naval training station, Great Lakes, Ill.

several days ago (November 1, 1914) and he said he was in better health at present than he had ever been and as far as he knew there were no after effects.

Case No. 5 (N—).—Admitted March 26, 1914. The entire medical record is given in this case as it was the most severe and the only one which did not clear up after the administration of four successive doses of the antimeningitic serum.

Patient was admitted to the hospital in the midst of a chill. Complained of an intense occipital headache and pains in the front of the chest. He appeared rather dull mentally and was not inclined to answer questions.

March 27: Increasingly apathetic. Eyes closed and when spoken to took quite a time to collect his thoughts. Headache persisted and was not relieved by analgesics. This headache was made worse by putting the neck muscles on the stretch. Kernig's sign mildly positive. Slight irregularity of the pupils. Heartbeats very irregular, jumping at times from 65 to 120. Spinal puncture was delayed several hours before a supply of serum could be secured, but was done within 24 hours of the onset of the disease. About 35 c. c. of turbid fluid removed; replaced by 30 c. c. of antimeningitic serum. Spinal fluid centrifugalized showed large numbers of leukocytes and epithelial cells but only a few intracellular meningococci. No cocci could be found in a smear.

March 30: Culture of the fluid removed on the 27th gave a pure culture of the meningococci. On the 28th had only a few signs of meningeal involvement in addition to stupor. Yesterday afternoon (29th) he became delirious and the petechiform eruption appeared, chiefly on his chest and back. Complained of double vision. Had marked tremors of the lips and fingers. Opisthotonos marked. Forty c. c. of spinal fluid removed; 30 c. c. serum injected. Pulse 80 to 120. Temperature 101° to 102° F. Smear from the fluid shows a few intracellular meningococci.

March 31: Thirty-five c. c. spinal fluid removed; 30 c. c. serum injected. Culture of yesterday's fluid positive for meningococci.

April 1: Thirty-two c. c. of turbid, blood-stained fluid removed; 30 c. c. serum injected. Smear shows very few meningococci. Delirious last night but was not restless. He lay in bed quietly talking to himself and was easily brought out of the delirium when asked questions.

April 2: Fifteen c. c. of bloody fluid removed; 15 c. c. serum injected. Smear negative for meningococci. Petechiform eruption profuse. Tongue dry and coated. Muttering delirium.

April 6: Comatose at times. Condition critical. Tremors of fingers, lips, and tongue. Pupils dilated. Has no rational moments.

April 11: Condition of patient has not been changed since last note. Has at intervals jerky movements of both extremities. Pupils react better to light. Able to answer questions better to-day.

April 15: No change since last note. Had several sinking spells, but rallied under stimulants.

April 21: Has involuntary stools two or three times a day. Puncture shows a slightly turbid fluid. Mental condition slightly improved. Pulse and temperature have been normal for the past three days.

April 30: Mental condition much improved. Still passes urine and feces involuntarily. Occasional vomiting spells.

May 2: Sixteen c. c. turbid spinal fluid removed; 15 c. c. serum injected. Has had marked twitchings of the fingers and lips for the past two days accompanied by considerable mental stupor.

May 4: Puncture yesterday dry. Culture of the fluid removed on the 2d shows a pure culture of the meningococci. Thirty-five c. c. of spinal fluid withdrawn this morning; 30 c. c. serum injected.

May 6: Culture of the fluid withdrawn on the 4th negative for the meningococci. Fifteen c. c. fluid removed; 15 c. c. serum injected. Seems much brighter mentally.

May 7: Fluid removed yesterday negative for the meningococcus.

May 11: Condition greatly improved. Slept yesterday for the first time in several weeks without a sedative.

June 5: Gaining strength rapidly. Has use of all his limbs except for slight contracture and numbness over the distribution of the left ulnar nerve.

July 1: Spinal column is stiff and slightly painful on extreme motion. Tires easily and seems mentally torpid.

August 3: Is strong enough to go to his home. Spinal column still stiff. Knee reflexes diminished. Vision and hearing normal. No change in the ulnar area.

This patient was surveyed and discharged from the service, as it was considered that he would not be able to return to duty for such a long time that his retention in the service would not be advisable.

A letter dated December 14, 1914, has been received from this patient, and he states as follows: "I am still suffering from some stiffness in my back, and at times it pains me to the extent that I have to lie flat on my back for hours, sometimes all day; then again I will not feel any pain for several days. The trouble is in the small of my back. My fingers are just as they were when I left the hospital. My eyes trouble me when I read too much, but my hearing is all right."

He states, however, that he is gradually improving from the condition in which he left the hospital.

Case No. 6 (B—).—Admitted April 21, 1914. Mental dullness, headache, restlessness, and pulse-rate irregularity most prominent symptoms. Stiffness of the neck muscles marked. Spinal fluid turbid and contained meningococci. Four doses of serum on successive days. Cultures negative for meningococci after the second dose of serum. Returned to duty July 10, 1914, with no sequelæ. Patient has been seen several times since and says he is all right in every respect.

Case No. 7 (G—).—Admitted October 26, 1914. Occipital headache, mental dullness, stiffness of the neck muscles, and slight fever. Spinal fluid turbid and contained meningococci. Four injections of serum. Cultures for meningococci negative after the second injection of the serum. Returned to duty December 8, 1914, with no sequelæ.

The cases reported do not bring to light any new factor, but rather help to emphasize the advantage of early administration of the antimeningitic serum. The reports are purposely made as short as possible.

A few comments on the symptoms observed will help to explain the cases better than long case histories.

These cases represented a fairly constant set of symptoms, of which the following were the most frequent in the early stages of the disease and helped to establish a diagnosis:

1. Mental dullness was the most constant symptom. If not present in the very beginning it soon appeared and was apparent even through the restlessness incident to the severe headache.

2. Stiffness of the neck muscles was present in every one of the cases. Dr. Cottle's method of eliciting this reaction should be closely followed. It seems to be an involuntary resistance on the part of the patient to your bending his neck, for he will always endeavor to bend it for you when you try to lift his head from the pillow. This stiffness continues on into the opisthotonos which comes on later in the disease.

3. Headache: There did not appear to be any particular type of headache at the beginning of these cases. Frontal seemed to be as common as the occipital in the very early stages. In the later stages the headache became occipital in type. This headache seemed to be paroxysmal in character, as the patients would lie still for a time and then suddenly cry out with pain and throw themselves from one side of the bed to the other.

4. Irregularity of the pulse rate and lack of parallelism to the temperature curve. In all of the cases, and particularly in No. 5 this irregularity was pronounced. In No. 5, in one hour, taken every 15 minutes, the pulse rate was 126, 69, 108, 78; the temperature at the beginning of the hour was 103.6° F. and at the end 104° F.

At another time the temperature was 100.4° F. and the pulse 120. This irregularity in nearly every case stopped after the administration of the second injection of the serum and apparently corresponded with the disappearance of the meningococci from the spinal fluid. The temperature in all these cases was around 103° F. on admission, and dropped to normal in the next two or three days, following the administration of the serum.

5. The white blood count was always high, ranging from 20,000 to 30,000, in the cases in which it was taken. In several of the cases we did not wait to have a white blood count made, as the symptoms were so evident we did not consider it necessary in establishing a diagnosis.

6. Kernig's sign was not typically present in more than one or two of the cases. In the others if it was present it was so slight as to be of little value in making an early diagnosis. It was always present in the later stages.

The symptoms as given below are the ones we observed later in the disease.

1. Restlessness; due in great measure to the severe headache. We mention it here because it is also an accompaniment of the administration of the serum. About six to eight hours after the injection of serum the patient begins to toss and roll around in his bed. This continues for several hours. The serum from two different firms was used in these cases and it was distinctly noticeable that the serum of one firm caused more disturbance than that of the other.

2. Constipation or a tendency to constipation was present in every case. This, however, was easily overcome by laxatives. In only one case was it necessary to use anything stronger than cascara.

3. An eruption of the petechial type was present in every case except the seventh. This eruption lasted from four to six days and was typical of the disease. A serum rash invariably appeared in about 10 days after the last dose of the serum. It consisted of an urticarial eruption of moderate severity, which did not seem to be accompanied by much itching or burning, lasting from three days to a week.

In each of these cases the first dose of antimeningitic serum was administered within the first 24 hours and in one of the cases in about 6 hours from the time the patient considered himself sick enough to report for treatment. Spinal puncture should not be delayed when the patient complains of intense headache (and there is no headache so intense), has stiffness of his neck muscles, a noticeable mental apathy and fever.

It is interesting to note in this connection the case of a lad who was transferred to this hospital with all the symptoms enumerated above except the stiffness of his neck muscles. A spinal puncture

was done at once and a clear fluid escaped. The fluid was cultured and was found to be sterile. When told that another puncture would have to be done in the morning his symptoms cleared up immediately.

In all of the cases the spinal fluid was turbid and the meningococcus was found both intra and extra cellularly in smears from the fluid with the exception of case No. 5, where it was found later in pure culture on Loeffler's blood serum. If the fluid was turbid we did not wait for a microscopical examination but injected the serum at once.

The fluid in every case was negative in the smear for meningococci after the second injection of the serum. In No. 5, owing to the breaking down of our incubator, proper cultures could not be made until the latter part of the attack. No. 5 was the only case where we had any difficulty in obtaining the spinal fluid. On several occasions we experienced dry taps or obtained only a very small amount of bloody fluid.

The serum was administered by the syringe and not by the gravity method. In our opinion the discomfort caused by the prolonged administration of serum greatly overbalanced the danger from the quicker method. Of course, where an anesthetic is administered the longer time can be employed to greater advantage.

The results obtained in these cases would lead us to believe that we were dealing with an attenuated meningococcus. If you will refer to the article by Dr. Cottle mentioned above you will see that while none of the cases reported by him were fatal, yet they were accompanied by serious sequelæ in a large proportion of the cases. None of the cases reported here with the exception of No. 5 had any sequelæ at all. There certainly was no lack of the presence of the meningococci, as in every case, except No. 5, they were numerous. It was our experience to find the fluid from the second puncture practically always negative. It may be that the serum and the early diagnosis deserve a large share of the credit also. We are of the opinion that they do, as the last case of all was given his first injection of serum within six hours of his first symptoms and before the meningococcus had had time to multiply to any great extent or get a foothold in the membranes of the spinal canal. This case also afforded us the opportunity to keep a close bacteriological watch upon the meningococci. The culture from the third and fourth spinal punctures were negative for the cocci, showing that the further administration of the serum was unnecessary. This seems to us to make it necessary that a culture on blood serum should be made from each puncture and that the injection of the serum should be kept up until at least two negative cultures are returned. If a laboratory is close at hand, the report on the fluid of the previous day can be obtained

before the next puncture is made. The spinal fluid itself makes an excellent culture medium, especially that from the first puncture. If the smear does not show any cocci or is doubtful, the fluid can be put in a warm place and allowed to incubate for about 12 hours, and if the meningococci are present they should be found in large numbers.

We have been unsuccessful in our attempts to find the meningococcus in the nasal secretions of these patients during convalescence, so have kept them in the hospital for at least a month after all of the symptoms have disappeared.

THE POSTERIOR URETHRA AND BLADDER IN A HUNDRED CASES OF CHRONIC GONORRHEA.

By A. L. CLIFTON, Passed Assistant Surgeon, United States Navy.

Before the advent of the cystoscope it was the custom generally, I believe, to treat a large number of cases of chronic gonorrhea in a similar way. There was usually a routine treatment to pursue, and this was continued until the urethral discharge stopped or possibly until one examination from the prostatic massage was negative for the gonococcus.

Now that the pathological condition of the posterior urethra can be studied, the treatment can be made directly to the part that is causing the trouble. It is a routine measure at present in this hospital to study every case of chronic posterior urethritis with the cystoscope and by this means it is possible to put the patient on a treatment directed at the pathological condition. Patients are also given a routine examination before discharge from the hospital.

The cystoscope which seems best adapted for the posterior urethral work is the McCarthy straight tube designed by Dr. Joseph McCarthy, of New York. This instrument gives an excellent field with a clear cut outline that is not possible with any other instrument.

Before beginning to study pathological conditions it is important to examine a large number of normal cases to be familiar with the normal conditions and to get the important landmarks.

The mucous membrane in the anterior urethra is pale and smooth and is thrown into folds to allow for a certain amount of distension. The urethra is normally in a state of collapse, and when a straight tube is introduced we are looking at the side of a funnel; the apex being the collapsed urethra. In the anterior urethra the apex of the funnel is a vertical slit.

The normal mucous membrane in the posterior urethra varies from a pale pink to a dark red. In the bulb the posterior wall of the urethra bulges forward, due to folds of mucous membrane. As we

approach the cavernous portion of the urethra the depression is less marked and forms a crescent figure.

The routine examination is made at two different periods. First the bladder is carefully examined and the ureters catheterized if necessary. At the second examination the urethra is examined as follows: As the cystoscope is withdrawn from the bladder the condition of the mucous membrane between the verumontanum and the internal vesical sphincter is noted. The blood vessels in this region are so arranged that they resemble a waterfall effect. If these vessels be followed anteriorly the verumontanum will be brought into view. Its size and condition is noted.

The prostatic utricle situated on the lower anterior surface of the verumontanum (containing the openings of the ejaculatory ducts) is visible at times, especially when there is seminal vesiculitis. The openings of the prostatic ducts on either side of the verumontanum can be seen if prostatitis exists. Normally they are not visible. The cystoscope is further withdrawn and the mucous membrane in the deep urethra is inspected. The openings of the ducts of Cowper's glands can be detected at times in the lower wall of the bulbous portion of the urethra.

Beginning stricture of the urethra is looked for; this sometimes shows as a narrowing of the lumen with a deep injection of the mucous membrane near this site. Urethral follicles at times are seen to be cystic or distended with pus. They are found on the anterior wall of the bulbous portion. The glands of Littre are visible only when pathological, and show up as dark-red pin-point dots in the mucous membrane. Crypts of Morgagni are usually situated on the upper wall of the spongy urethra. They are from 12 to 20 in number and are visible when distended with pus or as cysts in the urethral wall.

The most common condition found in the posterior urethra is dilatation of the prostatic ducts with a granular condition of the surrounding mucous membrane. There are approximately 18 prostatic ducts situated on either side of the verumontanum. As has been stated, these ducts are not visible under normal conditions. In many cases with dilated ducts the urethral mucous membrane has apparently a normal appearance. It can now be readily understood that if the treatment be directed toward the posterior urethra alone it will have little if any effect.

Of course the prostate is always enlarged when the ducts are dilated and may be indurated or boggy as the condition has progressed. At times the ducts are so widely dilated and the mucous membrane so contracted over the fan-shaped muscle that the condition amounts to a diverticulitis. In each of four cases there was a large diverticulum on one side of the verumontanum which was due



Fig. 1.—Shows the verumontanum with a diverticulitis of the posterior urethra. Openings of prostatic ducts are seen at the bottom of the diverticuli.

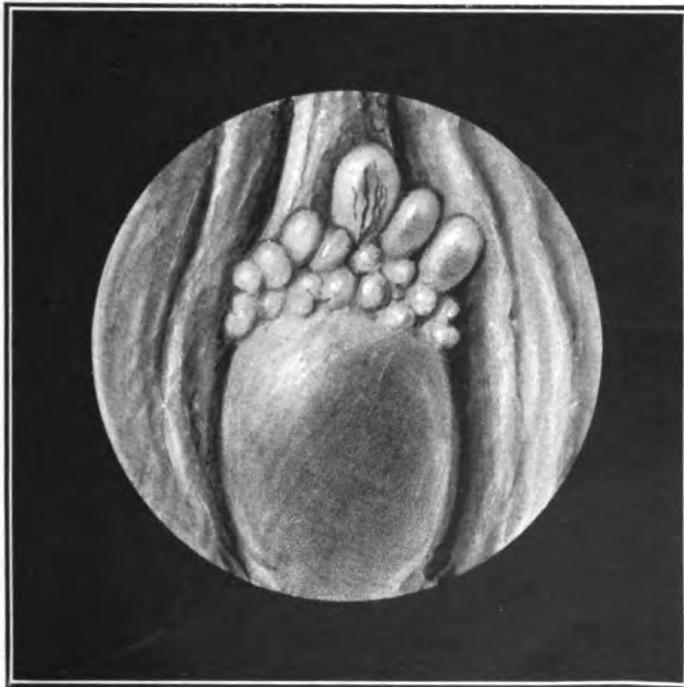


Fig. 2.—Shows a bullous edema on the upper surface of the verumontanum with papillomata. In this case there was a mucous discharge but no gonococci could be found in the urethral or prostatic smears. Condition was successfully treated with D'Arsonval current.

Clifton—Posterior Urethra.



Fig. 3.—Shows a thin fibrous band stretching across urethra in the region of the verumontanum.

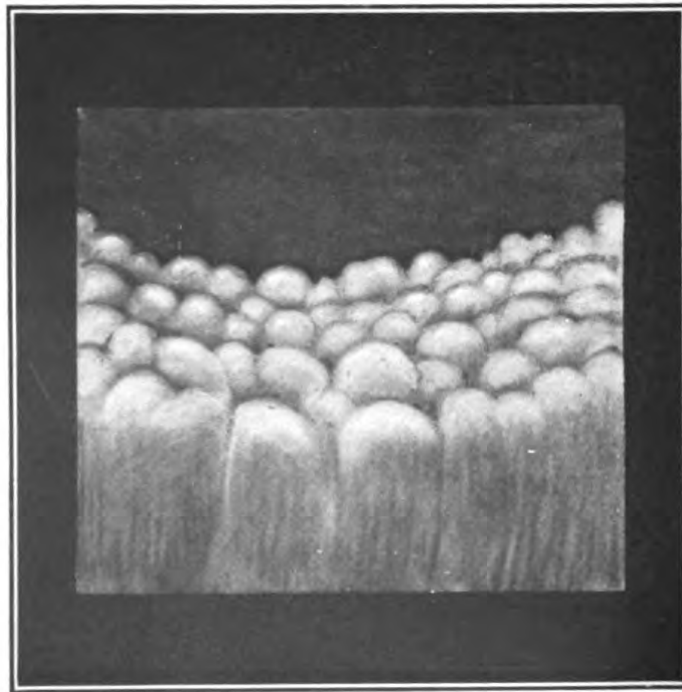


Fig. 4.—Shows a marked bullous edema of the internal vesical sphincter. Old case of posterior urethritis and prostatitis.

to a ruptured prostatic abscess. This condition was benefited to some extent by direct instillation of silver nitrate into the diverticulum through a ureteral catheter. Where the prostatic ducts are enlarged strings of pus can be seen coming out under pressure from water dilating the urethra. From this continued purulent secretion into the posterior urethra a chronic granular posterior urethritis develops. This may be general or there may be areas of spongy granulations which bleed easily on pressure. If the condition be general there is usually seen a purulent secretion lying over the affected area.

These are the cases that respond to local applications of 20 per cent silver nitrate or deep urethral instillations of silver nitrate 1 to 4,000. Associated with the above conditions there is usually found a hypertrophied verumontanum with or without bullous edema, the prostatic utricle standing out plainly.

At times a thick mucoid discharge can be seen coming from the dilated prostatic ducts, and this is undoubtedly one of the causes of a chronic gleet discharge. Many cases show this discharge while the bowels are constipated, showing that pressure on the prostate caused the discharge.

In 10 per cent of this series showing dilated prostatic ducts, one or both seminal vesicles were enlarged. Seminal vesiculotomy was performed by Dr. J. Bentley Squires in seven cases. Those who had gonorrheal rheumatism in addition to gonorrhea promptly cleared up. Those who had no joint involvement showed no marked improvement, except in one case.

Ten cases showed marked bullous edema of the posterior urethra with the dilation of the prostatic ducts. In one case the condition was so marked that the deep urethra was fulgurated with the D'Arsonval current. In about 5 per cent there were found papilloma of the deep urethra, accompanied by a persistent discharge in the morning, all having had gonorrhea at some time. In two of these cases showing a mucous discharge from the urethra, there were no gonococci present in the urethral or prostatic smears. In one case several papillomata were removed from the deep urethra by the bipolar spark, after which the urethral discharge stopped. In only two instances were papillomata of the bladder found and they were apparently not causing any symptoms. In this connection the fact is of interest that growths of this nature in the bladder are now being successfully removed with the bipolar spark. Recurrence with this method of removal is said to be less frequent than with supra-pubic cystotomy (Mayo's clinic).

In about 20 per cent of the series there was a marked injection of the trigone of the bladder, with symptoms of a low grade cystitis. One case showed small ulcerated spots at the outer margin of the internal vesical sphincter. This man was admitted to the hospital

with nocturnal enuresis. After several applications of 20 per cent silver nitrate the patient was restored to duty. Forty per cent of the series showed involvement of the glands of Littre, but only in a small number of cases was there any involvement of the crypts of Morgagni.

Treatment: Cases in which there was prostatitis with dilated prostatic ducts were treated with rectal douches, prostatic massage with the bladder about three quarters full of alum and zinc solution (one-half of 1 per cent), and irrigations of the posterior urethra with silver nitrate solution one to four thousand up to one to one thousand. The Kollmann dilator was used about once a week. With those in which the posterior urethra showed a granular appearance, direct applications of a 20 per cent silver nitrate solution were used. Diverticuli were treated with direct applications through a ureteral catheter. Papillomata were removed with the D'Arsonval or Oudin current. As stated above the D'Arsonval current was used in cases of bullous edema. Those which showed infection of the glands of Littre and crypts of Morgagni were treated with silver solution, massage, and sounds.

Vaccines were used in practically all cases of chronic prostatitis. From this form of treatment we have had very little success. Better success might have been reported had we used autogenous instead of stock vaccines. Electro-therapeutic sounds with an attachment for the high frequency current are now being used for the treatment of these chronic urethral cases. On cases of prostatitis which showed superimposed infection, autogenous vaccines (*Bacillus coli*, *Staphylococcus albus*, etc.) were used.

CONCLUSIONS: While the cystoscope and urethroscope are certainly valuable aids in the diagnosis and treatment of chronic urethral conditions, we are still unable to cope satisfactorily with a large number of cases. In some cases it has been assumed that the patient has been overtreated, and the treatment has been limited or stopped altogether. Many were admitted with large prostate glands; the gland subsided to almost normal size, urethral discharge stopped, but the cystoscope continued to show dilated ducts with pus pouring out on pressure, this pus showing the presence of the gonococcus. We have gotten one or two negative smears, but continuing the examinations at weekly intervals, the third or fourth examination showed gonococci.

Where the urethra alone has been affected the condition has cleared up rapidly with direct applications. There are apparently very few chronic cases, however, in which the prostate is not affected. One has only to look into the histological structure of the prostate gland and seminal vesicles to know that when these organs once become infected with the gonococcus it is an extremely difficult undertaking

to dislodge the infecting organism. Many cases undoubtedly have a superimposed infection which is the cause of prostatic abscess, or aggravates the already existing infection.

From an examination with the cystoscope and urethroscope about once a month in the more severe cases, a conclusion is drawn that there are a certain number of cases in which though clinically well, infection lies dormant, only to break out at a future time. This type of case where the discharge has stopped, and the prostate has diminished to normal size, and where it was only possible to demonstrate the gonococcus after repeated examinations, was described previously. These cases, however, may eventually recover, as the organism may lose its virulence after a long period.

In a number of cases a history was given of having had gonorrhea two or three years previously with no symptoms appearing in the meantime, when after a long alcoholic debauch a discharge from the urethra was noticed. On examination these cases show all the symptoms of a chronic infection and not an acute one. As there is very little literature written to-day on this subject and statistics are wanting, it is difficult to form any idea of the percentage of cases in which the gonococcus infection persists for a number of years. However, there are certainly a number of cases that resist all forms of treatment, and not only do not get well but are practically in the same condition after a prolonged course of treatment.

The drawings appended to this article were made by Bossi, New York, for Dr. Joseph McCarthy at the latter's cystoscopic clinic.

They are taken from cases admitted to the Naval Hospital, New York.

U. S. NAVAL MEDICAL SCHOOL LABORATORIES.

Additions to the pathological collection, United States Naval Medical School, January-March, 1915.

Accession No.	Tissue.	Diagnosis.	Collected by or received from.
1110.....	Heart.....	Empyema of pericardium with great distention.	Medical Inspector M. F. Gates.
1111.....	Appendix.....	Peculiarly placed and bound down.	Do.
1112.....	Spleen.....	Chronic interstitial splenitis....	Do.
1113.....	Brain.....	Aneurysm.....	Passed Asst. Surg. E. L. Woods.
1114.....	Blood.....	Tertian malaria.....	Passed Asst. Surg. L. W. McGuire.
1115.....	Spinal fluid....	Meningococcus.....	Hospital Steward A. Albrecht.

Additions to the helminthological collection, United States Naval Medical School, January-March, 1915.

Accession No.	Parasite.	Host.	Collected by or received from.
19911.....	Ticks and crab lice.....	.....	Asst. Surg. J. T. Borden.
19912.....	Dibothriocephalus latus.....	Homo.....	Passed Asst. Surg. D. H. Noble.
19913.....	Sarcoptes scabiei.....	do.....	Passed Asst. Surg. G. F. Clark.

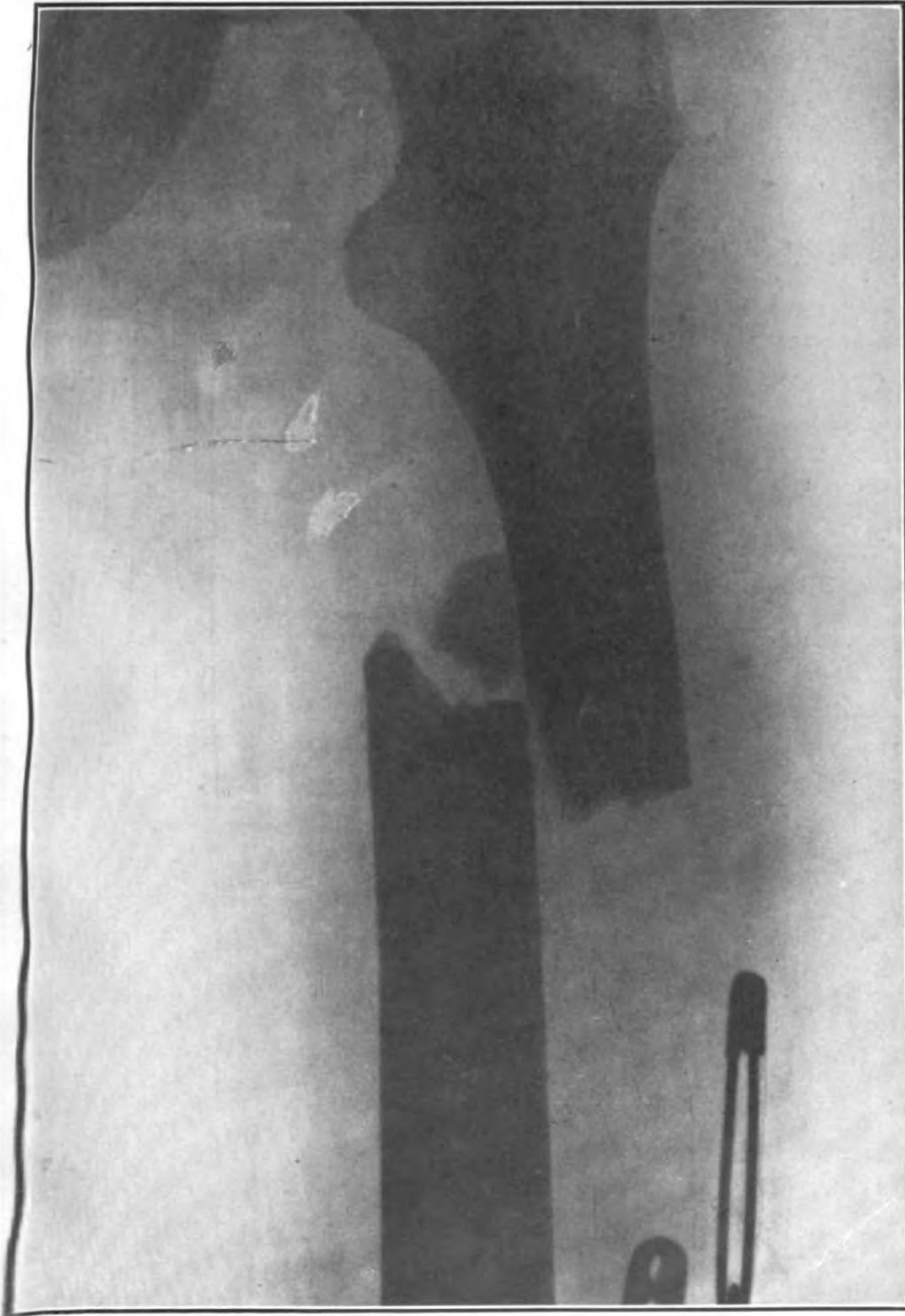


FIG. 1.—POSITION OF FRAGMENTS AFTER SEVERAL DAYS IN BUCK'S EXTENSION, WITH PULL VARYING BETWEEN 25 AND 35 POUNDS.

Dunn—Apparatus for Traction.

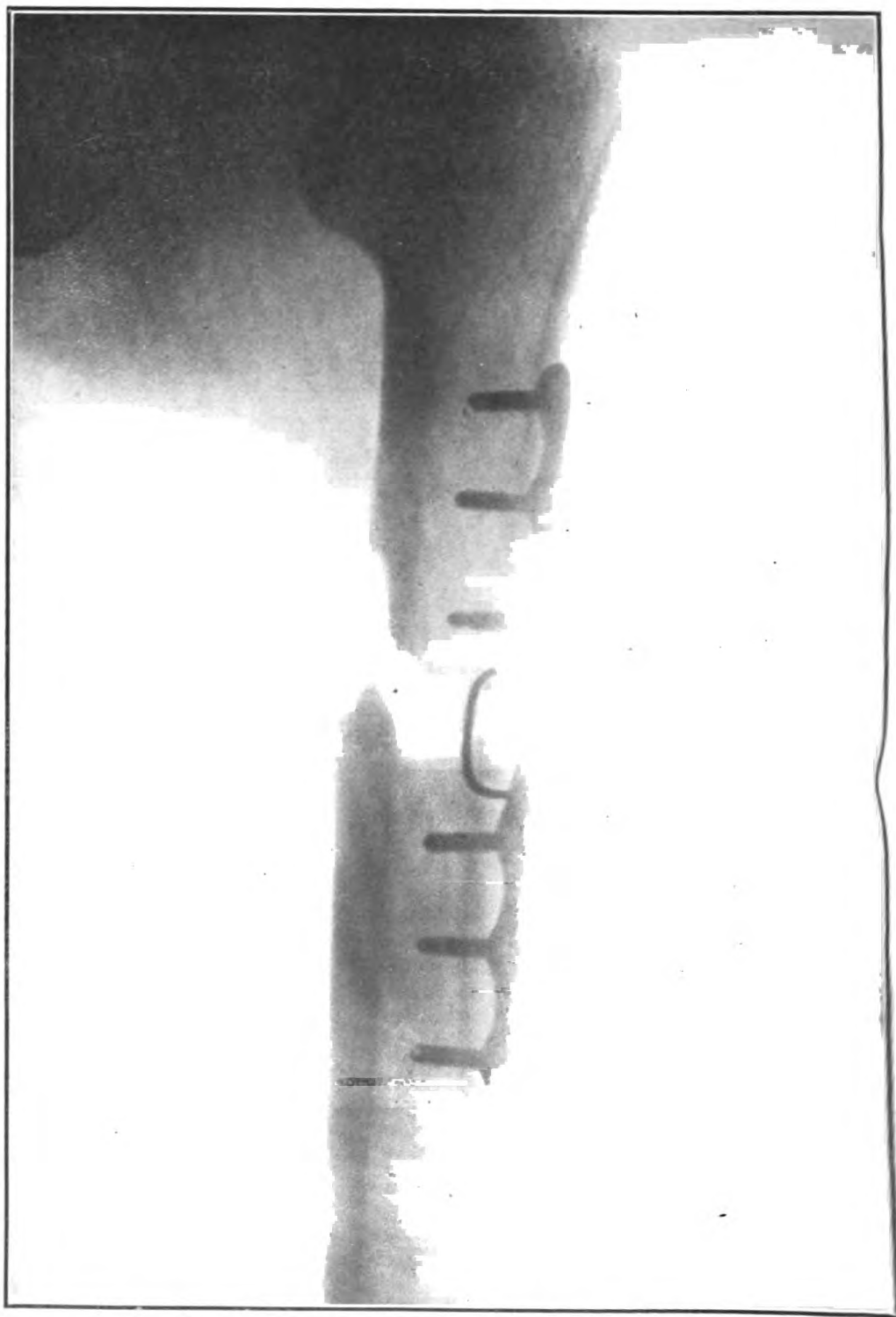


FIG. 2.—SAME AFTER TRACTION AND PLATING.

Dunn—Apparatus for Traction.



FIG. 3.



FIG. 4.



FIG. 5.

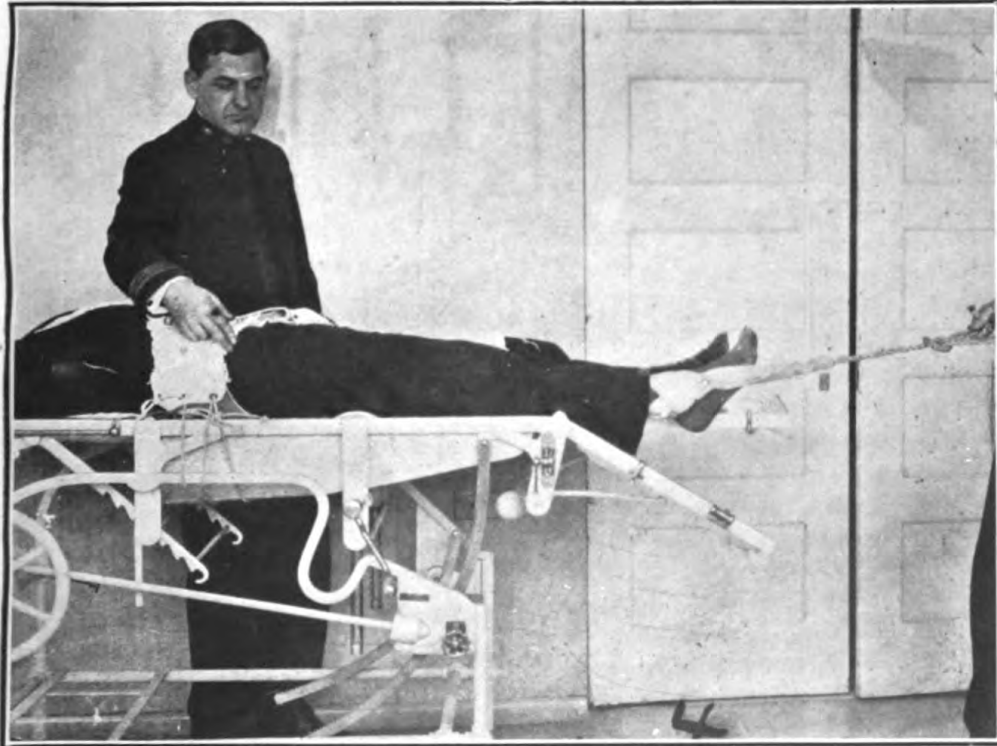


FIG. 6.
FOR DESCRIPTIONS SEE TEXT.

SUGGESTED DEVICES.

APPARATUS FOR SECURING TRACTION OF LOWER EXTREMITIES.

By H. A. DUNN, Surgeon, United States Navy.

The only excuse I have for presenting this article is that I desire to call attention to a very simple apparatus I had made to secure traction in a recent case of fractured femur in which plating was necessary.

Figure 1 shows the location of the fracture and also the position of the fragments after several days in Buck's extension apparatus with a pull varying between 25 and 35 pounds. It is unnecessary for me to mention the relative infrequency of this type of injury or the difficulties of reduction. Figure 2 speaks for itself.

The apparatus is made of stout canvas as shown in figures 3, 4, 5, and 6. It is to be noted that the side on which traction is to be made is cut high so that the body belt will just skirt the crest of the ilium. This belt has an overlap on each side provided with large eyelets for lacing to secure patient to the table as shown in figure 6.

For securing traction a clove hitch of canvas is put on the ankle and attached by a strong rope to the pull belt on the person making traction. See also figure 6.

This apparatus allows free access to the bones of the leg and thigh and recommends itself chiefly by reason of the ease with which traction is applied and maintained without interference with the operators.

CLINICAL NOTES.

LEUKOPENIA OF A MARKED DEGREE IN A FATAL CASE OF PNEUMONIA.

By E. R. STIRT, Medical Director, United States Navy.

On December 9, 1915, I saw, in consultation with Surgeon J. Stepp, United States Navy, a case of pneumonia, involving the left lower lobe, in a patient 71 years of age. This was the fifth day of the illness and the general condition of the patient seemed most favorable for one of his age. The condition of the heart was unusually good and the systolic blood pressure showed no reduction from that obtained in health.

There was unusually slight evidence of toxemia, so that a favorable prognosis seemed indicated.

In order to determine the patient's resistance I took a few blood smears, made by the Ehrlich method, and to my astonishment found, upon staining and examining them, that the leukocytes were markedly reduced in number. With this indication of lack of resistance the prognosis was changed to a most unfavorable one. White counts taken on December 10 showed a leukocyte count of 750 and on December 11, the day of his death, the patient only gave a count of 500 leukocytes per cubic millimeter. There was an entire absence of eosinophiles in the numerous smears examined and the polymorphonuclear percentage ranged from 56 to 64.

There was a striking absence of normal neutrophils, the great majority being either of the band nucleus (stabkernige) type or typically metamyelocytes. There were a few myelocytes. The lymphocytes seemed normal.

GASTRIC CHANGES FOLLOWING GASTRO-ENTEROSTOMY.

By H. F. HULL and O. J. MINK, Passed Assistant Surgeons, United States Navy.

B—. Ordinary seaman. Admitted April 8, 1914. Synopsis of medical history:

He had an attack of nausea and vomiting in the fall of 1913, which lasted about a month and from which he recovered without treatment. In January, 1914, he had attacks of pain in the left iliac region, associated with constipation, which were relieved by enemata; also had some pain and burning in the stomach. Since coming to the hospital has had no pain in the iliac region. Patient believes this is due to the fact that he is doing no heavy work. On admission, pain in stomach region comes on within an hour of eating, is relieved by vomiting, and aggravated by eating. The vomitus tastes acid and

is greenish. Once he vomited about a teaspoonful of bright red blood. He describes the pain as burning and extending over the epigastrium and sometimes up the esophageal region.

Note is made on April 20, 1914, that there existed a point of extreme tenderness 2 inches below the ensiform, and also tenderness on pressure on left side of twelfth dorsal vertebra. Stools are moderate in quantity, formed, and normal in color. Bowels seldom move without cathartics. States that he eats little, but he has lost little or no weight while in hospital. Stools tested for occult blood, negative. Stools would indicate patient is eating more than he thinks he is. Digestion good as indicated by stools. Physical examination is negative except in epigastric region, which is distended. There is tenderness between costal margins and extending to splenic region; practically the entire area above navel is distended and tender. Tympanitic area extends well up under the ribs on both sides.

On June 7 he had severe attack of pain, beginning soon after taking a cup of milk at 7 a. m. At noon he vomited while stomach tube was being passed. Examination of about 200 c. c. of yellowish material containing much mucus and what appeared to be fine milk curds: Total acid, 50 (0.1825); free HCL, 34 (0.124); combined acids, 10 (0.0365); no lactic acid; sediment negative.

June 13. Some improvement under daily washing of stomach. Ewald-Boas test meal given and gastric contents examined. See table.

June 15. Analysis after Riegel test meal. See table.

June 18. Some improvement after stomach has been washed several days.

June 23. Attack of pain last night relieved by washing out stomach.

June 27. Same.

July 3. Washing out stomach every second day relieves symptoms.

July 12. Stomach does not completely empty itself, and unless washed out pain results.

July 14. Preparing for exploratory operation.

From a study of the above-mentioned symptoms it seemed conclusive that we had to do with a stenosis of the pylorus, with its consequent dilated stomach. The cause of the pyloric stenosis we believed to be due to ulcer of the stomach or duodenum, or to adhesions resulting from an antecedent peritonitis. His previous history showed that he had been operated on for appendicitis the year previous and had been drained for a long time. We also considered the possibility of a cholecystitis, with resulting adhesions about the gall bladder and the duodenum. Under these circumstances, and because he did not improve under medical treatment, an exploratory operation was decided upon, and accepted by him.

He was prepared for a week previous by being fed on sterile food, using only sterile table utensils and drinking only sterile water. His mouth was cleaned before and after each meal by scrubbing his teeth and oral cavity with Dobell's solution, using a sterile brush. His stomach was washed daily with sterile water and with a sterile tube.

On July 17 he was given ether, and the abdomen was opened just to the right of the linea alba, dislocating the right rectus to the right side, but not cutting it. The stomach at once presented and was found to be greatly dilated, reaching to the umbilicus. It was very red and congested as well. Adhesions were found about the site of the old appendicitis, and a few were seen about the pyloric end of the stomach. The gall bladder and ducts were carefully examined and nothing pathological was found. The stomach and duodenum were examined for ulcer, but none was found, nor were any old scars seen. Attention to the pylorus then disclosed that it was stenosed to such an extent that a finger could not be made to enter it, much less pass through it. With a positive finding of a stenosed pylorus, adhesions, and a dilated and congested stomach, it was deemed best to do a gastro-enterostomy. This was done by the posterior no-loop method, the stoma being made large and at the lowest portion of the posterior wall of the stomach. It was accomplished by the double-suture method, the Roosevelt clamp being used, and presented no particular technical difficulties. In fact it was easier than a similar operation on the cadaver. Recovery was uneventful. He took liquids on the second day and soft diet on the seventh day. After that his diet was gradually increased until he was able to eat a full ration. From the time of operation his distress was relieved, his sense of fullness and oppression disappeared, and he was able to retain and digest food without the slightest trouble. He was returned to duty on September 2 free from symptoms, and has remained so until this date.

This case is of special interest because it has been possible to examine the patient and analyze his gastric contents four months after operation. The results of gastric analyses before operation and on November 9, four months after operation, are shown in the following table:

EWALD-BOAS MEAL.

	Before operation.	4 months after oper- ation.
	c. c.	c. c.
Capacity of stomach.....	2,500-3,000	600-800
Total acid.....	0.2556	0.1562
Free HCL.....	.1825	.1080
Combined acids.....	.0511	.0504
Total chlorin.....	.4118	.3960
Mineral chlorin.....	.2272	.2428

RIEDEL MEAL.

	Before operation.	4 months after oper- tion.
Total acid.....	c. c. 0.3195	c. c. 0.2664
Free HCL.....	.1068	.1512
Combined HCL.....	.1404	.0676
Total chlorin.....	.4544	.4320
Mineral chlorin.....	.1382	.1636

Attention is called to the remarkable decrease in the size of the stomach, to the great reduction in the total acidity, and to the fact that these changes were coincident with a complete disappearance of all symptoms. From a study of this case we believe that this patient had an ulcer of the stomach in the fall of 1913, probably near the pyloric orifice, which later resulted in adhesions and pyloric stenosis.

TWO CASES OF MALARIA TREATED WITH SALVARSAN.

By E. U. REED, Passed Assistant Surgeon, United States Navy.

In the United States Naval Medical Bulletin of April, 1913, I reported a case of tertian malaria treated with salvarsan (intramuscularly). Since that time I have treated the following two cases with salvarsan or neosalvarsan (intravenously) with equally excellent results.

Case 1. B—. Hospital apprentice, first class. Age, 29 years; white; enlisted in the early part of 1913, soon after completion of an enlistment in the Hospital Corps of the United States Army; denies all history of syphilis; states that he was infected with tertian malaria in October, 1912, while with the Army in Texas, and that he has since received about seven courses of quinin and arsenic after acute relapses. He received one course of quinin and arsenic pushed to the therapeutic limit and lasting about two months at this hospital. In spite of these repeated treatments (seven in 11 months), he again had an acute malarial paroxysm in September, 1913, and tertian parasites were again found in his blood in large numbers. Quinin was again given and, on September 15th 1913, when his maximum temperature for the preceding three days had been 100°, 0.6 gm. of salvarsan was injected intravenously. About six hours after the injection his temperature rose to 102.4° (pulse 98), but dropped rapidly to normal and remained within normal limits until September 20th. On that date it rose to 101° accompanied by moderate chill and malaise. It again dropped to normal within a few hours and remained normal until September 25th. A second intravenous injection of 0.6 gm. of salvarsan was then given and was followed by a rise of temperature to 103.8° (pulse 104). His temperature was normal on the following day and as long as his chart was continued. Quinin was discontinued at the time of the first

injection of salvarsan. On November 1st, 1914, he wrote to me that he had taken no treatment for malaria since the second dose of salvarsan, nor had he since felt any symptoms of malaria.

Case 2. P—Hospital steward. Age, 36½ years; white; admitted to the sick list on April 24th, 1914, with malaria. He stated that he contracted malaria about two years before in the Philippines (after six years' service), and that he received a thorough course of treatment with quinin and arsenic at that time. From health record: "For the past several months he has had severe attacks of sciatica and, more recently, chills and fever. To-night he had a severe chill, lasting about two hours and followed by fever, sweats, and vomiting. April 25: Blood contains many malarial parasites (tertian). Quinin commenced; leukocyte count, 3,800. April 29: Recurrence of sciatic pain; Emery test + in 1/40 dilution. This may be due to the malaria. All history of venereal disease is denied. (There was so great a disruption of red corpuscles and reduction of leukocytes and the denial of venereal disease was so emphatic that I believe the positive Emery test can be attributed to the malaria.) April 30: Gave 0.9 gm. of neosalvarsan intravenously. May 4: Discharged; much improved. Fowler's solution and potas. iodid prescribed. Note—May 7: Wassermann test negative."

On June 7, 1914, he had a slight chill, followed during the night by left sciatic pain. This had disappeared by June 9 under treatment with aspirin. On June 12, 0.9 gm. of neosalvarsan was given intravenously. On September 20, 1914, he wrote to me as follows: "In regard to your inquiry regarding my old complaint, am happy to say that I have had only a faint recurrence of it; in fact it was only a short twinge, lasting about 15 minutes, once while I was on leave. Since then have not been troubled in any way with it."

The intravenous injection does not appear, from my small experience, to have any advantages over the intramuscular administration and is liable to cause a high febrile reaction.

For further evidence of the specific action of salvarsan and neosalvarsan in malaria (particularly tertian infections) see the case previously reported by me and the articles listed below.

Salvarsan in malaria. *Deutsche Medizinische Wochenschrift*, Jan. 19, 1911. By J. Iversen and M. Tuschinski (abstract *U. S. Naval Bulletin*, July, 1911).

One case of malaria treated by salvarsan. The Military Surgeon, September, 1911. By Capt. M. A. Reasoner, Medical Corps, U. S. Army.

Salvarsan and malaria. The Military Surgeon, October, 1912. By First Lieut. R. H. Goldthwaite, Medical Corps, U. S. Army.

Malaria cured by neosalvarsan. *U. S. Naval Medical Bulletin*, July, 1914. By Surg. F. M. Bogan, U. S. Navy.

PSEUDOLEUKEMIC ANEMIA OF INFANCY OCCURRING IN TWINS.

By S. WALKER, Assistant Surgeon, Medical Reserve Corps, United States Navy.

Pseudoleukemic anemia, sometimes known as Von Jaksch's anemia, is a condition often characterized by marked leukocytosis, a marked reduction in the number of red cells and in the hemoglobin, a great enlargement of the spleen and usually of the liver and lymphatic glands.

At the present time the etiology and diagnosis of a specific condition such as Von Jaksch's anemia, described by him first in 1889, is still in doubt. There have been many cases of pseudoleukemia of infancy described by English, French, German, and Italian writers in the last 20 years and nearly all seem to disagree as to the diagnosis of Von Jaksch's type.

Probably the best paper on the subject up to date is the one by Koplik. He sums up the data as follows:

Von Jaksch's anemia of infancy is nothing more than a type of myelocytic leukemia in children, and is modified in the pathology by complicating diseases, such as rachitis and syphilis. A study of the blood picture in uncomplicated cases of this disease shows only a severe anemia in subjects in whom any disturbance of function of blood-forming organs causes a retrograde to fetal structure. That the clinical features are characteristic was as much as many authors would agree.

Hunter and Lovett have put these cases in three groups. They called them secondary anemias, with or without enlarged spleen, due to disturbance of the blood-forming organs.

Their types are as follows:

1. Cases with leukopenia.
2. Those with moderate leukocytosis.
3. Cases grouped as Von Jaksch's.

Morse says that there is no justification for putting cases of anemia with splenic tumor in a class by themselves under the head of splenic anemia, anemia of infancy, pseudoleukemia, etc. They should be classed as secondary anemias with splenic tumor.

That the condition is a primary disease of the spleen is the view held by Wolf. He removed the spleen from an 18-months-old child and it entirely recovered from anemia and took on weight. He explained the anemia not as a secondary condition, but as due to the destruction of red blood cells by production in the spleen of a substance which causes destruction elsewhere.

His conclusions are drawn from too few cases to warrant their being substantiated as yet.

Koplik, on summing up the literature, says there are three distinct directions of thought followed to-day:

1. Secondary anemia due to disturbance of nutrition which reacts on blood-forming organs and carries with it changes in the

blood due to action on these organs, but not due to a primary disease of either spleen, liver, or bones; as the Italian authors say, a disease traceable to disturbed gut function.

2. Primary anemia allied to leukemia, which may degenerate into myeloma.

3. Von Jaksch's type; primary blood condition accompanied by enlarged spleen and liver plus a pathognomonic blood picture.

The cases which I desire to report are those of pseudoleukemic anemia occurring in male twins, 12 months of age.

Clinically the two cases were identical except that one was a little more advanced than the other.

History: Father and mother Russian Jews, in good health; one child dead, cause unknown; one child living and well; twins were normal delivery and breast fed.

Physical findings:

Head: Enlarged, marked craniotabes. Eyes react to L. A. Pupils equal. Ophthalmoscopic examination negative. Ears negative. Throat and nose negative.

Neck: Few pea-sized glands along posterior border sternocleidomastoid.

Chest: Axillary glands enlarged.

Heart: Short systolic blow at apex.

Lungs: Negative.

Abdomen: Pendulous, no fluid palpable. Liver two fingers below costal arch, and firm. Spleen two fingers below umbilicus, and of firm consistence.

Genitals: Negative.

Extremities: Arms and legs bowed. Marked enlargement at lower ends of tibia and radius.

Skin: Flabby, loose, and soft.

Blood examination: Several counts were made and several different fresh smears counting 200 leukocytes were made. The average result is as follows:

A. Red blood count: 2,400,000.

White blood count: 58,000.

Hemoglobin: 24 per cent.

Differential count 200 whites, Skelton stain:

Lymphocytes—

Small: 99 = 49 per cent.

Large: 29 = 14.5 per cent.

Neutrophile: 52 = 26 per cent.

Eosinophile: 8 = 4 per cent.

Basophile: 4 = 2 per cent.

Myelocyte: 6 = 3 per cent.

Transitional: 2 = 1 per cent.

Marked number nucleated reds and basophilic degeneration; poikilocytosis.

B. Red blood count: 2. 5,600,000.

White blood count: 46,400.

Hemoglobin: 31 per cent.

Differential count:

Lymphocytes—

Small: 104 = 52 per cent.

Large: 32 = 16 per cent.

Neutrophile: 49 = 24.5 per cent.

Eosinophile: 4 = 2 per cent.

Basophile: 2 = 1 per cent.

Myelocyte: 7 = 3.5 per cent.

Mast cell: 1 = 0.5 per cent.

Transitional: 1 = 0.5 per cent.

Many nucleated reds; basophilic degeneration. Poikilocytosis. Wassermann reaction negative, also urine, in both cases.

The cases ran along on an even temperature for about 10 days. Then A began to have symptoms of gastro-enteritis with markedly foul green stools. He refused diet and steadily lost weight and on the third week of his stay in the hospital died. A post-mortem examination was refused and the parents took the twin home, fearing a like fate for it.

During B's stay in the hospital he took nourishment readily and gained about 2 pounds. He was apparently in fair condition on leaving. Have been unable to get information in regard to him since.

These cases evidently correspond well to Von Jaksch's type, but no doubt are secondary anemias, in all probability due to rachitis. The fact that there is one child well might add a little to the argument of a primary anemia in these children, that is, with the rachitis as a secondary factor.

CONCLUSIONS:

1. There is still much doubt as to whether Von Jaksch's anemia is a clinical entity.

2. The majority of authors agree that the condition is a secondary anemia due to infections or intestinal disorders (malaria, syphilis, rickets) and in these cases probably the latter.

3. These cases are of special interest occurring in twins. I am indebted to Dr. K. K. Koessler for his kind suggestions.

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Morse, *Jour. Am. Med. Assn.*, 1909, iii, 455.
Koplik, *Arch. Pediat.*, 1907, xxiv, 161-191.
Whipham, *Lancet*, London, 1906, ii, 307.
Wolf, *Arch. Pediat.*, 1907, xxiv.

EDITORIAL COMMENT.

GEORGE PERLEY BRADLEY, MEDICAL DIRECTOR, UNITED STATES NAVY.

Extracted from *Maine Medical Journal*, Vol. 5, No. 5.

The subject of this sketch was ninth in descent from Daniel Bradley, who landed from the ship *Elizabeth* at Ipswich in 1635 and later lived in Haverhill, Mass., where he died in 1657. His descendants since then have been distinguished in law, medicine, and public affairs, and have fought in the Colonial and Revolutionary Wars.

Although Dr. Bradley was not a member of this association, yet he deserves an appreciation in our journal, for he was an able physician, he represented Maine in the Navy, he was a typical example of what a high-minded surgeon in the service should be, and he contributed to our transactions in 1883 a remarkable study of the life of the most extraordinary anatomist who ever lived in Maine, Dr. Alexander Ramsay, of Fryeburg. His paper gives an extended account of the career of this noted man, originally from Edinburgh, but who crossed the ocean several times, lectured in many American cities as well as at the Dartmouth and Fairfield Medical Schools, and established at Fryeburg an anatomical school and museum, to which many students resorted. If Dr. Bradley had written only this Life of Ramsay, his title to permanent record in our journal would be established.

Dr. Bradley, the son of Alexander Ramsay Bradley and Mary Osgood Barrows, was born at Fryeburg January 3, 1849, attended the local schools and academy, and began the study of medicine with his uncle, Dr. Thomas Perley, of Naples, Me. He attended two courses of lectures at the Medical School of Maine, and in 1870 obtained his degree at the College of Physicians and Surgeons in New York. He was appointed assistant surgeon in the Navy in September of that year, and was promoted from grade to grade to that of medical director, retiring with honor in 1907.

It is not possible in this brief sketch to mention all of the positions which he occupied in his long career, but mention may be made of his cruises in the *Severn*, *Hartford*, *Mohican*, and *Indiana*. After every return to port he offered to the Bureau of Medicine and Surgery excellent papers concerning diseases, epidemics, and natural phenomena which he had witnessed and studied whilst abroad.

Dr. Bradley's duties on shore consisted in various commands at hospitals at Chelsea, Norfolk, and Mare Island, the Museum of Hygiene at Washington, and the examining board for retiring of officers.

The latter years of his life were rendered painful by physical ailments, but the climax of trouble was reached when his sight began to fail from simple glaucoma, the results of high myopia. In spite, however, of loss of sight he continued in good spirits. "Life to me is still worth living," as he wrote to me in the autumn of 1913. A few days previous to June, 1914, he failed rapidly from cardiorenal disease, and died on the 12th of that month.

One of Dr. Bradley's most important papers was a "Report of the sanitary and hygienic condition of the battleship *Indiana*," in which he went into the details of the construction of the ship from every point of view and laid bare its defects, especially in the lack of arrangements for first aid to the wounded in case of battle. This lucid paper has proved of value in the construction of other ships for the Navy. In another paper, "On the sanitary condition of the Mare Island Navy Yard," he mentioned the sanitary needs of our naval station on the Pacific frontier and prevention of the diseases likely to occur there. During a cruise to Brazil he met with a valuable Portuguese book On Remittent Fever, by Dr. Torres Homem, translated it and caused it to be published as of permanent medical value to the crews of ships in South America. During this same cruise he made a collection of butterflies, which he later presented to Bowdoin College.

When cruising in the Pacific he visited the leper colony at Molokai and wrote for the department an extended account of the various forms of the disease observed.

Amongst Dr. Bradley's literary essays mention should be made of one on "The people of the Hawaiian Islands," with accounts of their language, folklore, riddles, and religion. Read before the Folklore Society and printed in their magazine, it is of exceptional value as an ethnological survey of a disappearing people.

Perhaps the most lasting monument to Dr. Bradley's fame is his essay on "The negro emperors of Haiti." Starting with the foundation of that negro empire during the French Revolution, the reader is carried through the tragic lives of the native negro emperors, and a set of portraits ably illustrates the well-written paper.

Dr. Bradley was in advance of his times in medical thought. Suggestions creeping up later on are known to have been original with him. He was a good diagnostician, proud of his opinions, and sometimes obstinate in defending them. The results, however, generally confirmed the truth of his views.

As this notice shows, Dr. Bradley made the most of his time, was industrious, capable, and active in thought to the end of his days.

He read many languages with ease and satisfaction to himself, and loving his Latin, too, he often translated the odes and letters of the classic past. Dr. Bradley married October 5, 1876, Miss Annie Elizabeth Farmer, of Portland, and is by her survived.

This genial citizen and surgeon from Maine was brought to Portland at the end of his wanderings, and to his grave, if now and then we make a pilgrimage, we may think of the excellent work which he did to make a permanent record of the past of medicine in Maine and for the advancement of the medical service of the Navy of the United States.

A NEW QUARTERLY NAVAL MEDICAL JOURNAL.

The Statistical Report of the Health of the Navy (British) for the year 1913, Admiralty, October, 1914, contained in its introduction the following: "In the present report the appendix, which formerly contained original articles on professional subjects by medical officers, has been omitted, owing to the intended publication of a quarterly Naval Medical Journal * * *."

Volume 1, No. 1, of the Journal of the Royal Naval Medical Service has just been received in pursuance of the above. The subject matter is divided into (a) original articles, (b) editorial, (c) clinical and practical notes, (d) reviews, (e) abstracts and translations, and (f) news of the service. The editors are Fleet Surgs. R. C. Munday, R. N., and W. L. Martin, F. R. C. S. I., R. N. Advertisements are carried, as it is published by a private firm. Subscriptions are 15s. per annum. "Cheques or postal orders for subscriptions should be crossed 'Cox and Co.,' and be made payable to The Manager, Journal of the Royal Naval Medical Service, Admiralty, London, S. W., to whom all communications relating to subscriptions, etc., should be addressed."

The opening number is a most attractive one, reflecting credit on editors and publishers. Six of the nine original articles are on subjects connected with the war, and the wealth of medico-military material that will be available for future numbers from this source should assure a most successful opening year for the venture.

THE HARRISON LAW.

The attention of medical officers of the Navy is called to the provisions of the above law on the dispensing or prescribing of opium and cocain or their derivatives or compounds.

Article 12 of the Internal-Revenue Regulations, No. 35, states as follows: "Under the authority conferred by section 1 of the act named, for the issuing of regulations necessary for carrying the pro-

visions of the act into effect, physicians and surgeons writing any such prescription are hereby required to sign their name in full to the same, *to state therein their registry number* and the location of their office, and the name and address of the person for whom such prescriptions are written. Druggists and apothecaries must refuse to fill any such prescription unless signed as herein required; nor must prescriptions for such drugs be filled by any druggist or apothecary if he has reason to suspect that it was fraudulently issued or obtained.

“The dispensing of such drugs by druggists or apothecaries, except on physician’s *original* prescriptions, or on original orders issued to persons who have duly registered, will be in violation of the act. Refilling of prescriptions or orders is therefore prohibited.”

Application for registration should be made to the nearest collector of internal revenue. The annual fee is \$1, prorated for that portion of the fiscal year from March 1, 1915, to July 1, 1915, at 34 cents.

Any physician *dispensing* such a drug or preparation shall keep a record of such act, except that the actual administration to the patient, or the dispensing of not more than 2 gr. of opium, or $\frac{1}{4}$ gr. of morphin, or $\frac{1}{8}$ gr. of heroin, or 1 gr. of codein shall be exempt.

Nothing contained in the act, however, applies to any United States, State, county, municipal, District, Territorial, or insular officer or official acting within the scope of his official duties.

PROGRESS IN MEDICAL SCIENCES.

GENERAL MEDICINE.

E. THOMPSON, Surgeon, and E. L. WOODS, Passed Assistant Surgeon, United States Navy.

BARKER, L. F. Differentiation of the diseases included under chronic arthritis.
Proc. XVIIth Internat. Cong. of Med., London, 1913.

Arthropathies are still veiled in deplorable obscurities despite the progress which has been made in systematizing the chaos of diseases comprised under "chronic arthritis."

In the minds of the laity rheumatism means something mild, arthritis something more severe, and gout something reprehensible; but in the minds of the medical men the same terms are attaining to more exact definition as the distinctions among joint diseases are becoming more clearly drawn on the ground of essential differences.

There seems to be general agreement that the term gout shall be applied only to processes dependent upon abnormalities of the metabolism of purins. In the gouty arthropathy there is an excess of uric acid in the blood and a tendency to tophaceous deposits in the tissues. The clinical phenomena in typical gout are so characteristic as to permit of easy recognition, though in atypical cases there may be great difficulty in distinguishing gout from other diseases.

The present tendency seems to be to limit the term arthritis to true inflammatory arthropathies, acute and chronic, including the arthritis of acute rheumatic fever and other infections, as well as all forms of chronic joint inflammation, but excluding the noninflammatory and purely degenerative arthropathies.

Acute rheumatism has come to mean an acute febrile polyarticular affection, frequently complicated by endocarditis, pericarditis or chorea, not leading to suppuration of the joint, but responding promptly to treatment with salicylates and ending in recovery without residual joint change.

After bacteriological studies, acute infectious arthritis came to be better understood, and the acute nonsuppurative, polyarticular joint diseases resembling acute rheumatic fever, but differing from it in several important particulars, such as cause, course, occasional suppuration and relative inefficacy of salicylates, began to be grouped as pseudo-rheumatisms or as rheumatoids.

The tendency is to limit the use of the terms rheumatism and rheumatic to diseases due to the unknown virus which causes acute

rheumatic fever. The term chronic rheumatism is perhaps best reserved for a chronic arthropathy due to the virus which causes acute rheumatic fever. There may be some reason to doubt the existence of such a chronic arthropathy, and this can scarcely be definitely decided until the etiological agent in acute rheumatic fever is determined and it is found whether this is present or absent in the cases of supposed chronic rheumatic arthritis.—(L. W. JOHNSON.)

OSLER, Sir W. The war and typhoid fever. Brit. Med. Jour., November 28, 1914.

The author discusses the subject under various subheadings:

(1) The importance of the individual case as a factor in infection.

He states that it is only within the past decade that clinicians have sterilized the dejecta, urine, and feces; and kept the surroundings of the patient sterile. The possibility of the abolition of the disease depends on such sterilization.

(2) Recognition of the protean character of the disease.

"A transient febrile attack, slight diarrhea, bronchitis, acute nephritis, an attack of pneumonia, cholecystitis, acute pyelocystitis, may be a manifestation of infection."

(3) The discovery of typhoid carriers.

"Briefly stated, in from 1 to 3 per cent of cases of enteric fever the bacilli do not disappear from stools or urine. The patient becomes a chronic carrier and a possible menace to the community." He quotes the good results of Lentz, who was able to overcome the infectivity of some mothers who were carriers, by having them wash their hands after defecation and before handling food.

(4) Immunization.

He states that uniformly good results have followed immunization in all parts of the world.

Symptoms following inoculation.

1. A varying proportion show no symptoms, other than a little headache or malaise, with slight redness and swelling at the point of inoculation.

2. A larger proportion run a normal course of what may be called inoculation fever, which has many resemblances to the so-called serum sickness. There are headache, fugitive pains in the back and joints; sometimes abdominal tenderness. In mild forms temperature rises to 101° or 102°; in more severe, 103° or 104°. There may be slight mental disturbances or those suggestive of confusional insanity. Heavy exertion and exposure within 24 hours after inoculation, may be followed by sharp general symptoms. Two cases of appendicitis with perforation were reported by Prof. Boyd. One occurred within 24 hours and one within three days after inoculation.

Cases with untoward effects, local or general.

Pains in joints, superficial redness and even effusion may occur. Jaundice has been noted in a few instances. An illness not to be distinguished from typhoid fever may follow inoculation. Dermatitis has been reported. A few cases of pneumonia serve to emphasize the danger of exposure and overexertion.

Owing to excellent sanitation, typhoid is less common in Great Britain than in the United States or Canada.

RECOMMENDATIONS.

1. Every recruit who has had typhoid fever or who has lived in a house with a case of typhoid, within 12 months, should be marked for laboratory study.

2. A realization of the extremely protean character of the disease, so that mild cases of enteritis, obscure forms of bronchitis, and pneumonia, and mild cases of fever should be watched with care.

3. Every case should be regarded as a focus of infection, as long as bacilli are present in the discharges. All cases should be segregated, in large camps and garrisons.

4. No case to be given a clean bill of health, until he has been shown by bacteriological examination to be harmless.

5. Ample provision should be made for the careful bacteriological examination of all suspected cases.

The author then considers the statistics from various wars in the past, and shows that the typhoid bacillus has caused more deaths than the bullets of the opposing armies. Fingers, flies, dust, and food are incriminated in the transmission, when the water supply is above suspicion. The typhoid bacillus will kill in 1914, in the United States, more than will German shrapnel and bullets in France and Russia.—(G. F. CLARK.)

Concerning the statement in the preceding paragraph, the following note over his signature appears in the *British Medical Journal* for December 5, 1914:

"In my lecture, which appeared in the *Journal* of last week, I was in error in stating that the Eberth bacillus would probably kill in this year in the United States as many as would the German shrapnel and bullets in France and Russia. Judging from the recent figures it would be nearer the mark to say that it would kill as many as would die of wounds in the British forces."—(L. W. JOHNSON.)

OVERTON, F., and TURRELL, G. H. The use of the Schick test in the suppression of a diphtheria outbreak. *Monthly Bulletin*, New York Department of Health.

The outbreak of diphtheria in which the observations were made was during May, 1914, at the Howard Orphanage and Industrial School at Kings Park, Long Island, N. Y., where there were 260

inmates under 16 years of age. The methods used were first to take cultures from both nose and throat of every inmate. It was found that many times one would be positive and the other negative. The carriers were then isolated from the germ-free inmates. The second step was to immunize every inmate not already immune. The Schick test was utilized to detect those who were susceptible to the disease. This consists in injecting superficially under the skin one-fifteenth of the M. L. D. of diphtheria toxin. A red spot developing about the site of the injection in about 48 hours indicates a susceptibility to diphtheria, while no reaction indicates that diphtheria antitoxin is naturally present in the blood and that the person is immune to diphtheria. Fifty per cent of the inmates were found to be immune. Most of the 90 carriers found were immune and this probably accounted for their freedom from symptoms. Seventy-five per cent of those having had diphtheria showed a positive Schick reaction within 6 to 12 weeks after developing the disease.

It is concluded that the Schick test is of great value in detecting susceptible persons in an epidemic of diphtheria. One thousand units of antitoxin usually afford protection for from 21 to 28 days, while a second dose, as a rule, protects for only about a week. The test shows that the immunity conferred by an attack of diphtheria is of short duration. The removal of adenoids and diseased tonsils is a valuable means of freeing diphtheria carriers from the bacilli.—
(R. SHEEHAN.)

TAUSSIG, A. E. The present status of the treatment of advanced cardiac decompensation. Interstate Med. Jour., Dec., 1914.

No method of treating a seriously impaired circulation can succeed unless the patient has sufficient rest. The rest must be mental as well as physical. There is usually such discomfort in these cases that sleep must be induced artificially. The rest-producing measures include hydrotherapy, veronal, adalin, or paraldehyd in rather large doses. In many cases everything but morphin will fail. If morphin is required, it must be used in doses which will surely induce sleep. A single adequate dose is better than two smaller doses, even though the two doses are more than the single one. Another method of giving morphin is small doses by the mouth at frequent intervals; thus one twenty-fourth of a grain every three hours, with or without digitalis, will produce a feeling of comfort during the day and a quiet sleep at night.

Diet must be made a part of the rest treatment, and the digestive tract must not be taxed. The proper diet for an advanced case of decompensation should be easily digested food, with a rigid exclusion of salt, and restriction of water intake. These requirements are

best met by a form of the Karell skimmed milk regimen. A good plan is to give the patient not more than 1,000 c. c. of milk per day for five days. This must be absolute, and nothing else, not even water, should be allowed. If thirst is excessive, a little fruit juice or small amounts of morphin may be given. At the end of the five days the diet is relaxed for two days; more milk, with toast with unsalted butter, and rice are allowed. Then the strict skimmed-milk diet is repeated for five more days. The results are often astonishingly good. There will be a feeling of great comfort; the dyspnea will be less, and the heart action will improve. One advantage of this regimen is that it seems to increase the effect of digitalis. The heart, that before treatment proved refractory to digitalis, may, after it, respond rapidly and satisfactorily to smaller doses than before.

This radical starvation diet is advisable only in cases where the cardiac decompensation is the paramount trouble. If the kidneys are seriously involved and if uremia is impending, the Karell diet should not be undertaken.

The test of the Karell regimen in heart cases is the amount of diuresis. This, with increased salt output, should increase and reach its maximum about the fourth day. If no diuresis sets in, the treatment is usually a failure and the prognosis is bad. The treatment can also be checked by the albumin in the urine. The albumin will diminish or disappear if it is due to the passive congestion of decompensation. If the albumin persists, the presence of organic renal disease may be inferred. The effect on edema is striking. It will often rapidly disappear.

This diet gives best results in pure myocardial degeneration and in cases of cardiac weakness due to valvular lesions. Cases of hypertension do not respond well and nephritics are not benefited.

Diuretic treatment can be carried on with the Karell diet.

The author prefers strophanthus to digitalis, especially when prompt action is desired. The effect of strophanthus in the vein may often be observed in one hour. In cases of cardiac asthma its use with morphin gives prompt relief. The danger in the use of strophanthus is due to the fact that the therapeutic and toxic doses are separated by a small margin. When digitalis has been recently taken the danger of such a potent alkaloid as strophanthin is very great, for the reason that the amount of digitalis in the blood and heart muscle is not known. When giving strophanthin in the vein two rules must be obeyed. First, wait until five days have elapsed since the last dose of digitalis; and second, to test a possible idiosyncrasy, a small dose must be given and not repeated for twenty-four hours.—(E. T.)

OPIE, E. L., and ALFORD, L. B. **The influence of diet upon necrosis caused by hepatic and renal poisons.** Jour. Exper. Med., Jan. 1915.

The fact that there is a wide variation in the susceptibility of individuals to the same poisons led the authors to seek some factor which may modify the effect of toxic substances.

Diet seemed to be the most prominent and suggestive factor, and experiments were undertaken to ascertain if it had any influence on the severity of intoxication and disease. White rats were used because they are omnivorous and eat readily.

The aim of the experiments was to estimate the damaging effect of chloroform and phosphorus on the liver, and of potassium chromate and uranium nitrate on the kidneys, as modified by a diet of (a) carbohydrates, (b) meat, and (c) fats. It was found that the toxic effect, as shown by necrosis of the liver and of the tubules of the kidney, was very much less in animals which had been on a carbohydrate diet. The carbohydrates were found to be protective and prevented the disintegration of protein. Under this diet a smaller amount of protein was needed to maintain nitrogen equilibrium. In fevers of infections and in artificial fevers it has been found that it is possible to retard increased protein catabolism by adding carbohydrates to the food.

The increased elimination of nitrogen and sulphur which accompany disintegration of body protein occurs also in necrosis of the liver when caused by chloroform and phosphorus poisoning. The necrosis is, perhaps, the anatomical expression of advanced destruction of body protein. Carbohydrates limit the necrosis by protecting body protein. Chloroform necrosis occurs in the center of the hepatic lobule and in the loops of Henle in the kidney. Infiltration of fat occurs in these same situations when the rats are fed with fat. So the stage is set, as it were, and the solubility of chloroform in fat and its fixation in the cells may be the cause of the selective necrosis. The lesions of uranium nitrate are severest in the loops of Henle which also accumulate visible fat under diet. Potassium chromate, which causes necrosis in the convoluted tubules, is more severe in its effect after a protein diet. Susceptibility to phosphorus, which causes a fatty degeneration and necrosis of the periphery of the hepatic lobule, is greatest after a meat diet.

There are certain pathological lesions which closely resemble those caused by the above-named chemicals. Toxemia of pregnancy and acute yellow atrophy of the liver show a necrosis which resembles the effect of chloroform poisoning. In eclampsia the distribution of hepatic necrosis is the same as that which phosphorus causes. Focal necrosis of the liver and spleen are found in typhoid, malaria, diphtheria, and other infections.

A conclusion is drawn that diet may exert an important influence upon the incidence and progress of kidney and liver lesions in disease, an increased susceptibility being created by a meat and fat diet.—(E. T.)

STENGEL, A., and AUSTIN, J. H. Syphilitic nephritis. *Am. Jour. Med. Sc.*, Jan., 1915.

It appears well established that many cases of nephritis are caused by the organisms or toxins of the infectious diseases. This is true in diphtheria, scarlet fever, la grippe, pneumonia, and others. As syphilis is essentially a chronic disease, the relation between it and nephritis can not be so easily determined as in acute diseases. The subject is further complicated by the fact that there are no characteristic pathological lesions in the kidney. Gummata of the kidneys are rare. The efforts to demonstrate spirochetes in renal tissue and in the urine have not been sufficiently successful to make this method one which could be used as a direct and positive test.

Most cases of nephritis have been observed in syphilitics under treatment and there have been discussions as to whether the kidney lesions were a consequence of syphilis or caused by mercury and arsenic. However, there are quoted cases of syphilis with nephritis before any treatment was undertaken and subsequent active mercurial medication had caused a diminution and disappearance of evidences of nephritis along with improvement of the specific disease.

Munk has added a new diagnostic point. He noted the occasional presence of doubly refractile lipoids in severe cases of nephritis and found them so abundant and constant in cases where there was reason to suspect syphilis as to warrant the recognition of a direct relation between the presence of these doubly refractile lipoids and syphilis. When these lipoids, in the urine, are examined with polarized light they show the characteristic maltese cross.

In 1895 Kaiserling discovered that the fat globules of the adrenal cortex are doubly refractile. Since then considerable work has been done and it has been found that various lipoids give rise to polarizable globules. These globules seem to be an intermediate state between true fluids and true crystals. They appear normally in the adrenal cortex, the thymus, the lentine cells, the puerperal uterus, the mesentery and the choroid plexus. Their pathological appearance in a cell is evidence of degeneration of more serious significance than the common glycerine ester type of degeneration.

The authors' observations are not completed but their work so far brings out the fact that in cases of nephritis with a positive diagnosis of syphilis a majority had doubly refractile lipid globules in the urine. Where the type of disease was parenchymatous the lipoids were almost constantly present. In nephritis of other etiology the lipoids are not so constant.—(E. T.)

PHILLIPS, L. Is emetin sufficient to bring about a radical cure in amebiasis? Brit. Med. Jour., December 19, 1914.

Phillips states that while it is now quite unnecessary to describe the good effects obtained with emetin by injection in amebiasis, in many cases the results are not permanent. This tendency to relapse after apparent cure brings amebiasis into line with other protozoal diseases and diseases caused by animal parasites, such as malaria, syphilis, and trypanosomiasis, which may quickly and readily react to drugs, but which require a prolonged course to effect a cure.

Recent investigations by Walker, Kuenen, Wenyon, and others have all shown that in acute dysentery and in hepatitis the *Entameba histolytica* is found in the amebic stage. Vedder and Rogers have shown that emetin in a dilution of 1 to 10,000 within a few minutes killed the active stage of *Entameba histolytica*, having no action on the *Entameba coli*.

This explains the rapid action of emetin especially in cases of hepatitis. Unfortunately as the patient recovers, the cystic form appears in the feces and may persist indefinitely and give rise to fresh relapses. Walker and Sellards found in their artificially infected cases the infection persisted for as long as two years and four months in one case, and he was then passing cysts in large numbers. It has been further discovered that while emetin will remove and kill ameba in the active stage, it has no effect upon the ameba in the cystic state; hence the patient remains a carrier, a danger to others, and is himself liable to relapses and complications.

The following line of treatment is therefore suggested: Emetin hypodermically for at least 10 days or longer if the state of the patient demands it, followed by the oral administration of the drug.

Subsequent courses at increasing intervals, as in syphilis or malaria, and in the intervals courses of calomel with thymol or some other parasiticide.

No case should be considered cured until, after several examinations, no cysts of *Entameba histolytica* are found.—(E. L. W.)

UEDA, I. A case of a large aneurism of the arch of the aorta with use of bronchoscopy. Bull. Nav. Med. Assn., Japan. May, 1914, No. 9.

A man 43 years old was suffering from severe stasis-inflammation of the bronchi, in consequence of a large aneurism of the arch of the aorta. The sputum was dark brown and very tough, and could hardly be expelled, because of paralysis of the left recurrent nerve, and also on account of muscular paralysis on the right side as the result of continuous catarrh and overexertion. This fact much aggravated the dyspnea already present (as a symptom of the compression of trachea). Fits of suffocation often occurred.

Inferior tracheotomy was performed; and through this wound inferior bronchoscopy.

Bronchoscopic examination: The trachea was displaced forward and to the right. Its lumen was stenosed as the tracheal wall yielded to compression. The stenosis began 5 cm. below the cricoid cartilage and gradually increasing reached its narrowest part 2 cm. above the bifurcation, and then decreasing, it became almost normal at the point of the bifurcation. A second stenosed part was found near the second bifurcation of the left bronchus. This time, however, the lumen was compressed from above and to the left, and a hemispherical projection of the wall with distinct pulsation could be seen. In spite of constant catarrhal inflammation, the entire mucous membrane was pale and smooth.

Through the wound of the tracheotomy König's tube was inserted. The symptoms were much alleviated. Breathing became tranquil. The sputum was easily expelled, and no more fits of suffocation followed. But, as anticipated, four days after the operation the aneurismal sac ruptured into the trachea, and the patient died.

The reports hitherto made on this subject are not all reliable. Some were found to be tumors by autopsy, others were only imperfectly described. This case, the author claims, is the most typical example. The aneurism was large enough to display all the important symptoms and what was seen by bronchoscopy during life was confirmed by postmortem examination.—(R. C. R.)

MENTAL AND NERVOUS DISEASES.

R. SHEEHAN, Passed Assistant Surgeon, United States Navy.

BLISS, M. A. The importance of the bony sinuses accessory to the nose in the explanation of pains in the head, face, and neck. *Jour. Nerv. and Ment. Dis.*, January, 1915.

Frequently pains in these regions are treated for long periods with various internal remedies when the explanation lies in the accessory sinuses, and the ganglia and nerve trunks adjacent thereto. A rather clear symptom-complex springs from the post-ethmoidal sphenoidal district. Pronounced headache, vertigo, nausea, and optic swelling arise also from this field. The ordinary casual examination of the nasal region does not suffice in this work. There must be numerous and painstaking examinations of the whole area by a competent rhinologist before it can be eliminated as a causative factor.

The manifestations of trouble about this area are frequently accepted even by neurologists as expressions of a neurosis. This is often due to the fact that the chief cause of complaint—that of pain—is so very protracted, troublesome, and resistant to treatment. In

cases, for instance, of supraorbital neuralgia associated with frontal sinus infection, where all traces of pus have disappeared, the mucosa continues to present a chronic inflammatory appearance and the neuralgia continues in the presence of this slight evidence of a pathological condition. Pus is not necessary to the inference of cause and effect. Neuralgias are readily superimposed upon pyogenic infection even after all traces of pus have disappeared.

This is also true in the myalgias which so often are sequels of infection, and may be located quite distant from the original source of infection. At times definite muscle pains and occipital neuralgias can be traced to infection of tonsil crypts and pyorrheal pockets.

This is a matter of low grade sepsis with shifting areas, at times circumscribed, of pains or tenderness of muscles, nerves, and joints. Patients may become much depressed because of the distressing degree of the pains resulting from these chronic sinus infections. Occasionally these supraorbital neuralgias behave much like the attacks of migraine that have their onset in and above the orbit, and they are often difficult of differentiation. The use of autogenous vaccines is often of utility in treatment.—(R. S.)

TAYLOR, A. S. and STEPHENSON, J. W. Spinal decompression in meningomyelitis. *Jour. Nerv. and Ment. Dis.*, January, 1915.

This is based upon a very small series of cases, but is deemed worthy of note because of the unusually satisfactory results obtained in a condition heretofore deemed beyond surgical measures. In these cases, when not fatal, there is always a tedious illness followed by a slow cessation of active symptoms and the persistence of a greater or less degree of invalidism, according to the site and amount of permanent damage to the substance of the cord, so that in selected cases it is believed that decompression may greatly shorten the period of invalidism and may enhance the completeness of recovery.

It is concluded that such cases are susceptible to surgical intervention where the findings indicate the segmental level. The treatment should be laminectomy, free opening of the dura, and, probably, incision into the posterior columns of the cord, especially in those cases showing marked infiltration and swelling of the cord. This operation, with proper technique, adds little to the jeopardy of the patient, but, on the contrary, seems to greatly diminish the period of convalescence and to lead to a more nearly normal return of function in the cord than is usual in these cases under expectant treatment. It has been repeatedly demonstrated that laminectomy is not a very dangerous operation. Decompression acts favorably by causing freer circulation with the more rapid absorption of the inflammatory exudate. Incision of the cord facilitates drainage.

The small risk inherent in laminectomy, and the great advantage likely to accrue to the patient, argue much in favor of the surgical treatment of these cases. The same facts also argue for the earlier employment of exploratory laminectomy in most spinal cases where the diagnosis is not perfectly clear, but where the symptoms point to some cord level as the seat of trouble.—(R. S.)

GREGORY, M. S. *Fleeting attacks of manic depressive psychosis.* Jour. Nerv. and Ment. Dis., January, 1915.

Short attacks of this disorder are more frequent than those necessitating hospital treatment. They may last from a few hours to several days, and unless accompanied by noticeable causative factors escape recognition. The picture is frequently marked by alcohol. A great majority of the lapses of periodic drinkers, especially with the so-called pathological drunkards, are really brief attacks of this psychosis associated with alcohol.

When not colored by alcohol these mild attacks may be mistaken for transitory mental affections of other character, such as hysteria, psychic epilepsy, etc. They may be concomitant with somatic disorders and regarded as migraine neuralgia, "nervous dyspepsia," "nervous heart," etc. Even when the attacks are longer the diagnosis may be difficult because of the working due to other factors, especially alcohol.—(R. S.)

TURNER, W. A. *Epilepsy and cerebral tumor.* Brit. Med. Jour., December 5th, 1914.

The writer takes up a question which has provoked considerable interest, due to the fact that brain tumors often give rise to seizures having features which are no different from those occurring in the so-called idiopathic or true epilepsy but which really belong to the symptomatic epilepsies. The diagnosis is difficult when these epileptiform attacks occur over long periods of time before there are any signs or symptoms indicating intracranial tumor, to which the seizures are probably due.

It is difficult to state definitely in just how many so-called epileptics the symptoms are due to tumor, but if the cases could be followed out there is no doubt that this cause would be found back of many of them, especially the variety beginning in late adolescence. Often the best diagnosis obtainable for years may be "epilepsy."

In tumors involving the cortex and subcortical white matter of a cerebral hemisphere the seizures may have features characteristic of idiopathic epilepsy. These attacks may precede the onset of the symptoms and signs of intracranial tumor by many years and render the diagnosis of the true cause of the attacks nearly impossible. The

existence of certain signs, however, favors the presence of an organic lesion, such as a well-defined local warning, the presence of some degree of postconvulsive hemiplegia, inequality of the deep reflexes on the two sides, unilateral abolition or impairment of the abdominal reflexes, and, above all, the development of an extensor plantar response. Eventually more decided evidence of a destroying lesion is shown in hemiplegia, hemianesthesia, hemianopsia, or aphasia according to the locality of the tumor. When along with such well marked signs optic neuritis and the other general symptoms of intracranial new growth are present there is no longer any doubt that the seizures are symptomatic of a cerebral tumor. It is therefore important in all cases of epilepsy to examine the reflexes and the optic discs from time to time, especially if a decided change occurs in the character of the fits or any new symptoms occur.—(R. S.)

GOODALL, E. **The ductless glands and mental disease.** *Lancet*, London, December 12, 1914.

This is a subheading of one of the Arvinian lectures and deals with a subject that has provoked much interest among psychiatrists. Psychoses may be dependent upon defect or disease of the thyroid gland, and oftentimes the mental symptoms disappear as a result of medical treatment or surgical intervention directed to this gland. That mental disturbance may be caused by thyroid treatment in those predisposed, and that it ceases when treatment is stopped does away with the theory that Grave's disease and the psychosis are dependent upon a common cause when they are concomitant.

Addison's disease may provoke mental symptoms resembling "neurasthenia" or even dementia paralytica as well as affective states.

In epileptic psychoses changes appear in the thyroid, parathyroid, pituitary, and suprarenal glands. This is especially true of the thyroid.

In dementia precox and manic depressive psychoses no uniform changes of glandular structures have been noted. In dementia paralytica the thyroid showed changes in about 75 per cent of cases. Amaldi is quoted, who found lesions in 56 per cent of 107 cases of diverse forms of insanity as against 32 per cent in 22 sane controls.—(R. S.)

FEILING, A. **Acute paraplegia.** *Lancet*, London, December 12, 1914.

The important consideration in this condition is that of prognosis, and in order to make this an accurate diagnosis is essential. An acute paralysis of the lower limbs may be based on various pathological processes of which the most important are, (1) poliomyelitis, (2) acute myelitis, (3) acute peripheral neuritis or toxic polyneuritis

(in Korsakow's psychosis—R. S.). The first is identical with so-called infantile paralysis, and is an acute inflammatory disease of the central nervous system in which the spinal cord is most frequently and seriously affected. The majority of acute myelitides are syphilitic, being usually based upon a gummatous meningitis associated with a myelomalacia following the thrombosis caused by endarteritis. This conclusion has been substantiated by the positive sero and cytological findings in these cases. In the toxic neuritides the pathology is less definite. It is often due to alcohol.

In all of these conditions the clinical factors are important; for example, the patient's age may enable a distinction to be made.

In poliomyelitis characteristically there is a day or two of constitutional disturbance, which is followed by an acute onset of paralysis; pain is often prominent; objective sensory loss does not occur and the sphincters are unaffected. Hypotonia is conspicuous. The end paralysis is always less than that at the beginning.

In myelitis the patient is older. After a short period in which there may be tingling and numbness, the paralysis occurs quickly and is complete in a few days. While early it is of the flaccid type, it later becomes spastic with exaggeration of the deep reflexes and extensor plantar responses. There is marked loss of sensation, and this may be absolute up to a definite segmental level, which is in strong contrast to poliomyelitis. It may be a dissociated anesthesia. The sphincters are affected—urinary retention and obstipation. The end result is spastic weakness.

In the toxic neuritis sensory symptoms are most marked. Motor paralysis is less complete and is usually distal. The anesthesia is not segmental and is also distal. There is marked hyperesthesia, especially when the causal factor is alcohol. There is no sphincter involvement. Rapid muscular atrophy occurs with alteration in the electrical reactions. The paralysis does not become spastic. A sudden paraplegia is possible in locomotor ataxia and disseminated sclerosis, and in the former is usually transient. Here the general symptoms are indicative of the condition. In disseminated sclerosis the remittent course may have to be relied upon for differentiation.—(R. S.)

SURGERY.

A. M. FAUNTLEROY, Surgeon, and E. H. H. OLD, Passed Assistant Surgeon, United States Navy.

NIPE, W. H. W. The Freiburg method of *Dämmerschlaf*, or twilight sleep. *Am. Jour. Obst.*, December, 1914.

"Twilight sleep" is defined as "that condition of the mind in which, while the patient remains perfectly conscious and intelligent, she at the same time loses a knowledge of present events when they are completed." Scopolamin and morphin or one of its derivatives

were first used to induce this condition in labor cases by Steinbüchel in Gratz in 1903. He sought a method whereby the pains of childbirth might be lessened without producing narcosis, and for this purpose used one or two injections of scopolamin 0.0003 gm. and morphin 0.01 gm. He concluded that the pains of childbirth were "markedly diminished" and that the method had no disadvantages. Others tried this method with some variation in dosage, especially in that but one dose of morphin 0.01 was used. The general result in about 600 cases reported tended to show that when only one dose of morphin was given and the scopolamin repeated at suitable intervals and in small doses, 0.0003, the method was successful.

This method was taken up by Gauss in Freiburg, who slightly increased the dosage—scopolamin 0.00045 to 0.0006 gm.—but gave only one dose of morphin, 0.01 gm., as an initial dose given in separate solutions, followed at intervals of an hour or more by injections of scopolamin 0.00015, as indicated by the "memory test," which is described later. The "pupillary test," "motor coordination," and "Babinsky reflex" were also used.

With this method in 300 cases he obtained the following results: Dämmerschlaf, 78 per cent; lessening of pain, 16.3 per cent; negative, 5.7 per cent.

Of 303 babies (three sets of twins) the result was: Born alive, 98.3 per cent; stillborn, 1.7 per cent; crying lustily, 56.4 per cent; asphyxia, 14.2 per cent; oligopnea, 27.1 per cent.

Later, when the method and dosage had been worked out more accurately, i. e., using as little of the drug as would produce the desired effect, Gauss reported 1,000 cases: First 500, oligopnea, 23.5 per cent; second 500, oligopnea, 12.7 per cent. First 500, asphyxia, 12.8 per cent; second 500, asphyxia, 6.3 per cent.

In the 1,000 cases the placenta was: Expressed spontaneously, 51 per cent; by Credé method, 48.1 per cent; manually extracted, 0.4 per cent.

Forceps were used: First 500 cases, 9.68 per cent; second 500 cases, 4.59 per cent.

In the last 363 cases: Simple physiological bleeding occurred (500 gm. or less), 92.8 per cent; moderate bleeding (500–1,000 gm.), 6.3 per cent; considerable bleeding (1,000–1,500 gm.), 0.9 per cent.

The results obtained by several others are also given, and the summary shows that when only one dose of morphin 0.01 gm. was used and the scopolamin used in small doses, and only repeated as indicated by the memory test, no ill effects were experienced by either mother or child. When ill effects were experienced they were due to overdosing.

In speaking of the technique he divides twilight sleep into three zones, dependent on dosage: The first, a zone of underdosage, the patient being completely awake; the second, a zone of overdosage, in which there is complete narcosis; the third, a zone between, in which there is perception but no memory of events occurring at the time and which is the one desired. This zone can only be obtained by a proper use of the "memory test," which must be carried on continuously during the whole course of labor. The test is as follows: Three-quarters of an hour after the initial injections are given some common object is shown to the patient, and after an interval of 20 to 40 minutes the object is again shown. If the patient remembers having seen it at the time first shown, she is still completely conscious and the scopolamin is repeated; if she does not remember having seen the object, she was at the time it was first shown in twilight sleep. A different object should be used for each test, to avoid an accumulative effect on the memory due to continually recurring impressions on the patient's clouded consciousness and thereby interfering with the test. Instead of objects being shown, the various obstetric procedures, such as pelvimetry, examinations, catheterizations, and injections may be made use of, as may other occurrences that take place.

In giving the injections the morphin muriate, 0.01 gm., is injected subcutaneously first; the needle is left in place and a second syringe containing scopolamin, 0.0003 to 0.00045 gm., is inserted into the same needle and injected. In three-quarters of an hour the memory test is applied, and depending on the result the scopolamin is repeated in a dose of 0.00015 to 0.00045 gm., and so on, throughout labor. Note that morphin is given but once. Small repeated doses of scopolamin do not seem to have an accumulative effect.

A failure to obtain twilight sleep may be due to, (1) attempts to produce the condition too rapidly, (2) beginning the injections too early (primary uterine inertia is the one great contraindication to twilight sleep), (3) trying to do away with *all* pain.

Narcotin (morphin meconate), under the trade name of "narcophin," may be used in place of morphin in one dose of 0.03 gm. This drug with scopolamin is being tried at Freiburg in a certain class of cases following a method that does away with the memory test. As given by Siegel it consists of:

	gm.
A first dose of narcophin 0.03 and scopolamin.....	0.00045
Wait 45 minutes and give second dose of scopolamin only.....	0.00045
Wait 45 minutes and give narcophin 0.015—scopolamin.....	0.00015
Wait 1½ hours and give scopolamin.....	0.00015
Succeeding doses are given every hour and a half of scopolamin.....	0.00015
and with every third dose give also narcophin.....	0.015

The results so far have not been as satisfactory as in the individualizing method.

At Freiburg the drugs used are: Solution of morphin muriate kept in ground-glass-stoppered bottles. Scopolamin hydrobromid solution with 10 per cent mannit added as a preservative. Narcophin (Boehringer & Soehne, Mannheim, Germany). Used in Siegel method. Pantopon (used only occasionally).

Dämmerschlaf or twilight sleep is at present suitable for hospital practice only, as it demands constant attention by a skilled obstetrician. To obtain the best results, the room should be darkened, the ears of the patient stopped with cotton, and everything kept as quiet as possible.

The after-treatment, unless there be laceration, temperature rise, or anemia, consists of passive exercises for a period of 10 minutes night and morning within 24 hours after delivery; the patient sits up in bed a great part of the second day; she sits up in a chair within 72 hours, and on the fourth day may walk about. Patients at Freiburg usually leave the hospital on the sixth or seventh day. This procedure has produced no ill effects, and, if anything, has helped involution and a rapid return to normal condition. According to Gauss, early rising results in less phlebitis, less retroversion, less muscular relaxation, and causes a more rapid involution.

Under dangers to the child, the author gives, first, the direct effect of the drug itself; second, the effect of the drug on the forces of labor, prolonging the length of labor to such an extent that the child's life is endangered; third, the effect of the drug on the child's early development; fourth, the effect of the drug on the nursing ability of the mother and its indirect effect, therefore, upon the child. These dangers may be avoided by proper dosage and individualization.

Salzberger investigated the condition of Freiburg babies and found that there was no more than normal mortality, and in those cases that were watched for a year the treatment seemed to have no dangerous effect on the life, health, and development of the child.—(W. G. STEADMAN.)

BARNEY, J. D. Observations on the seminal vesicles. Interstate Med. Jour., November, 1914.

Barney begins his article with a very interesting discussion of the physiology of the seminal vesicles.

Investigators have shown that the seminal vesicles have a secretion of their own and further, that this secretion is a *sine qua non* of procreation. In experimentation with white rats, it has been demonstrated that extirpation of the vesicles alone produced a marked diminution of the genetic power so well marked in these animals.

The seminal secretion is quite a complex substance, containing histones and some of the higher proteins. Bacteria are present also in the seminal secretion of healthy animals, and in those dying of acute sepsis the specific organism is to be found in the secretion.

The secretion of these organs arises from the activity of the cells lining the cavities and attains its maximum production at the age of puberty.

The presence of elastic and connective tissue in the subepithelial tissues and muscular walls is easily demonstrated.

The seminal vesicle is now looked upon not only as a reservoir for spermatazoa and as a secretory organ, but also as an organ of excretion. Barney states that in autopsy specimens, and a few cases at operation, cultures of the vesicular contents were found to be sterile. And in the case of a patient with acute joint involvement and recent gonorrhea, the vesicular secretion was culturally sterile, but an unknown bacillus resembling in many ways that of Ducrey, was found intramurally. This discovery is extremely interesting and opens up a field for investigation, the results of which may clarify some of our problems of infection. The vesicular contents, consisting of the testicular and seminal fluids, must be distinguished from the seminal fluid which comes only from the cells of the vesicular walls.

Emphasis is laid on the value of the X-ray in the study of the normal and pathological vesicle, using collargol for producing the outlines of the vesicles. Two excellent radiograms accompany Barney's article, one showing the normal and one the pathological seminal vesicles.

He sums up by stating that, "with the aid of the microscope, the knife, and the X-ray, certain definite facts have been shown: That if one vesicle is diseased, so also is its fellow; that during early infection of the vesicle, dilatation of the cavity occurs, due either to cessation of its normal peristalsis, or to obstruction of the ejaculatory duct, or to both. This is followed by a deposit of scar tissue in and around the vesicles until they become lost to rectal palpation, and when dissected are found enormously thickened, with cavities shrunken and in some places almost obliterated."

The importance of the condition of the prostate and ejaculatory ducts in the presence of pathological vesicles is brought to our attention and assumption is made, on clinical grounds, that infection of the latter accompanies similar infection of the former.

The failure to cure chronic arthritis by vesiculotomy or vesiculectomy is stated to be due probably to the fact that in addition to either of the above measures the prostate has not been considered, and removal or drainage of this organ should accompany vesicular operation.—(H. W. COLE.)

COTTON, F. J. **Rubber gloves. A technique of mending.** Surg., Gynec. and Obst., xix, No. 6, Dec. 1914, p. 780.

Take an ordinary library filing card, spread it rather heavily with ordinary library paste and paste on it the rubber tissue (dentists' rubber dam of light weight); smooth it flat and allow to dry.

When a patch is needed, cut one out, rubber, card and all, to fit the tear. Put the glove on the hand, inside out, moisten the patch with cement, let it dry a few seconds, put it in place, and press it down hard.

If the tear is large, lay the moistened patch down and fit the edges of the tear to it, then press. Then powder the glove and lay it aside. Later soak it in water and the card comes away as the paste dissolves. The patch is secure, adherent even to its edges, flat, and water-tight. It stands boiling as well as any patch.—(L. W. JOHNSON.)

MAKINS, G. H. **A note upon the wounds of the present campaign.** Lancet, London, Oct. 10, 1914, p. 905.

Wounds produced by the small caliber bullet maintain an aseptic condition if uncomplicated, while shrapnel and shell wounds without exception become infected and suppurate. Suppuration, even in the case of extensive wounds of the soft parts has led to less serious consequences than might have been expected; the surfaces rapidly clear up, especially under the influence of an iodine bath (dr. to the pint), and the patients, after a couple of days' rest in bed, show little sign of constitutional infection. This is also the case in many of the compound fractures.

The wounds produced by shrapnel balls vary with the velocity at the time of impact; some merely bruise; others penetrate and produce injuries of the most severe explosive type. The entry wounds are small, often of the slit or gutter type, while the exit may be a large mass of extruded lacerated muscle with numerous fragments of the comminuted bone exposed upon the surface.

Acute tetanus, running a very rapid course, has been a very serious complication. An attempt to control it by administration of prophylactic doses of serum to all patients with severe open wounds as soon as they are brought in from the field is now being made.—(L. W. JOHNSON.)

GORDON, G. S. **The silence of renal tuberculosis.** Surg., Gynec. and Obst., February, 1915.

Emphasis is laid on the fact that renal pain or tenderness is not to be regarded as a necessary symptom in making a diagnosis of renal tuberculosis. Hence the term "silent," as they utter no word implicating the kidney.

Attention is directed to three groups of "silent" kidneys in which tuberculosis should be thought of in arriving at a diagnosis.

1. When a patient presents himself for loss of weight and strength when no other cause can be found, and there are pus cells in the urine.

2. When hematuria is possibly the only symptom.

3. When cystitis of apparently unknown origin is present. For although tuberculosis of the kidney may give rise to no symptoms, tuberculosis of the bladder, secondary to renal tuberculosis, practically always speaks out in advanced cases, and speaks out very loudly.

Diagnosis.—There are always pus cells in the urine. If the case is one of hematuria, the leukocytes may be masked by the large numbers of red cells; but after the bleeding has stopped the pus cells may be found. The only possibility of the pus cells being absent occurs when the tubules or ureter become blocked. One must be on guard if the urine is alkaline; then the pus cells may lake on standing and for this reason all urine should be inspected microscopically as soon as possible after it is voided.

Pus being present in the voided urine, it can be demonstrated that it comes from a source above the urethra by the "two-glass test" or by catheterization. Pus in the second glass or in the last of the flow through a catheter is presumptive evidence of a seat of inflammation in the upper urinary tract.

This inflammation may be caused by one or many of the pathologic microorganisms. For the most part they get along very well together. The gonococci and staphylococci are perhaps most frequently associated, the colon bacillus and the proteus bacillus more frequently are solitary invaders, but any of them may be found with the tubercle bacillus. Generally the tubercle bacillus is alone at first and cultures will therefore be sterile. An apparently sterile pyuria should be regarded with great suspicion. And, on the other hand, cystitis is not to be regarded as nontubercular because other microorganisms are present.

After pus has been found, stain for tubercle bacilli. If they can not be found it does not follow that they are not at the root of the condition. Some claim that they can be demonstrated in 60 or 90 per cent of cases. The author regards this as a very high percentage.

If tubercle bacillus can not be found in the urine, the author loses no time in using the Von Pirquet or Moro tests. If the temperature is normal he injects $\frac{1}{2}$ mg. of old tuberculin and increases the dose if no reaction follows. If no reaction follows an injection of 2 mg. he takes it for granted there is no tuberculosis. If the cultured urine is sterile and there is a reaction from the old tuberculin, renew the search for tubercle bacilli in the urine and if unsuccessful,

use the guinea-pig test. If the latter is negative, even if the old tuberculin test is positive, we have excluded tuberculosis of the urinary tract as nearly as possible. The only chance of error is that the focus is sealed so that no bacilli get in the urine. There are two other simple tests which may be tried for what they are worth. Tuberculosis of the bladder is usually extremely intolerant of silver nitrate irrigations, and when this salt is very badly borne it is suggestive. The second test is made by pressure on the ureter through the vagina or rectum. If renal tuberculosis is present a referred pain is felt in the kidney region. If tuberculosis of the urinary tract is present, its main focus and extent in "silent" cases must be made out by means of the cystoscope or by exploratory operations over both kidneys. This latter course is inexcusable when ureteral catheters can be passed, but advisable when they can not. If this routine is followed fewer cases will reach the surgeon at a stage when interference is hopeless.

The author sums up as follows:

1. Renal tuberculosis gives no local symptoms in a large percentage of cases.
2. Its first manifestation may be hematuria or symptoms of its spread to the bladder.
3. A history of gonorrhea, or the finding of colon bacillus, staphylococci, or other pathological microorganisms in the urine, in no way excludes the concurrent presence of tubercle bacilli. In fact, renal tuberculosis predisposes the urinary tract to other infections and the tubercle bacillus is usually reinforced by such allies before it has progressed far in its invasion.
4. The importance of early diagnosis of tuberculosis is fully recognized when the lungs are involved. It should be as fully recognized when its main focus is in the kidney; for it is usually unilateral at first, when the whole focus can be removed and the patient cured, but in time may become bilateral or miliary, when the case is hopeless.—(A. M. F.)

LINDER, W. *Acute hemorrhagic pancreatitis.* Surg., Gynec. and Obst., February, 1915.

A positive diagnosis of acute hemorrhagic pancreatitis can not be made with absolute certainty, since we still lack a distinct pathognomonic sign for this disease. Laboratory aids, such as the Cambridge reaction and the Wohlgemuth diastase blood test, are of no value in this condition. A tentative or probable diagnosis can be made in a certain number of cases, provided a careful history is obtainable and the various phenomena, as they present themselves, are properly interpreted.

The most striking feature of this condition, clinically, is the evidence of peritoneal disturbance in the upper abdomen, the so-called "acute abdomen," which all surgeons agree is an indication for surgical interference; and acute hemorrhagic pancreatitis should always be borne in mind in such cases. When finding the peculiar odorless, sero-sanguineous fluid and the small flecks of fat-necrosis, it is direct and undoubted evidence of acute hemorrhagic pancreatitis.

The best results are obtained in cases in which operation precedes the stage of necrosis or pus formation. Hence, early surgical intervention in all such cases will be rewarded by more frequent recoveries.

The writer's personal observation of the intense cyanosis of the distended small intestines, with the peculiar granular or gritty feel of the thickened great omentum, has helped him in many cases to recognize the condition at operation, and look to the pancreas at once as the cause of the trouble. This is of special value in cases operated upon for supposed intestinal obstruction. The abdomen opened, the condition should be looked for and recognized quickly. Prompt and efficient drainage should be instituted, causing the patient as little shock as is compatible with good surgical technique.

The high medium incision is the best one to use, because it is the most favorable for exploratory purposes. The lumbar incision has its indications, but is only rarely resorted to, and then usually in late cases when abscess is pointing in the lumbar region. Post-operative hemorrhage is not an infrequent cause of death. It is due to necrosis usually occurring in late cases. Therefore, early operation and gentle manipulation is the prophylactic treatment for this unfortunate complication.—(A. M. F.)

DOWD, C. N. **Preservation of the iliohypogastric nerve in operation for cure of inguinal hernia.** *Ann. Surg.*, February, 1915.

The marked improvement in results of operation for the cure of inguinal hernia following the modern method of procedure is reviewed: In 1886 Wood reported that there were 27 per cent of relapses, and in 1890 Bull reported 36 per cent. In 1890 Bassini described his operation. Since then the following reports of relapses have been made: 2.8 per cent (Bassini), 2.5 per cent (Judd), 0.8 per cent (Bull and Coley), 1.7 per cent (Murray). Though the percentages are small, still the number of cases is considerable when considering the large number of hernia operations being performed, as nearly 10 per cent of the surgical operations are for the relief of hernia.

Attention is called to the fact that nearly all the recurrences are in the form of direct hernias. Some are referred to as "bulgings" and others as "direct bulgings."

Dowd considers that there are two special precautions that should be practised and taught: 1. Adequate suture; 2, preservation of the nerve supply. Under the first the usual procedure is mentioned. Under the second the nerves encountered in this operation are described and well illustrated. The nerves mentioned are the twelfth dorsal, the iliohypogastric, the ilioinguinal. They contain both motor and sensory fibres and supply muscles, peritoneum, fascia, and skin. The iliohypogastric is found between the other two and communicates with them; when it is large they are small, and vice versa. They give off motor fibres to the transversalis, internal oblique, external oblique, and rectus muscles.

Attention is especially called to that part of the iliohypogastric nerve which crosses the field of operation and is exposed by splitting the aponeurosis of external oblique. In retracting this aponeurosis two nerves are exposed to view; the ilioinguinal in the lower part of the wound down toward Poupart's ligament, the iliohypogastric crosses the field of operation and runs into the aponeurosis of external oblique about one inch above the external ring.

The author considers that the cutting of this nerve probably takes place often and without any bad result, but that such an accident may also account for a reasonable percentage of the cases of relapse and for this reason every precaution should be taken to preserve its integrity. He advises first opening the aponeurosis of the external oblique about $1\frac{1}{2}$ inches above and external to the ring with a knife, and then slipping curved scissors through this opening and pushing nerve and muscle back before enlarging the incision. He believes the preservation of the iliohypogastric nerve is far more important than that of either the ilioinguinal or genitocrural.

In his article Dowd did not mention the possibility of the painful wounds, which are sometimes met with after this operation, being caused by the iliohypogastric nerve being included in the sutures which are passed through the conjoined arch and tendon. From this standpoint the discussion which followed the reading of his article is interesting and some remarks are worthy of mention.

Dr. A. S. Taylor said that this nerve instead of being cut was sometimes caught in the sutures and caused a neuritis with considerable pain and tenderness.

Dr. A. S. Vosburgh said that a neuritis or neuralgia might easily be caused by the pinching of the nerve in a suture. He considered that many of the small direct hernias were present, but not recognized, at the first operation. When the neck of the sac was external to the deep epigastric artery he performed the Bassini operation; when it was internal he did a transplantation of the rectus.

Dr. Moschcowitz said he agreed with Dr. Taylor in regard to possible neuritis following the inclusion of this nerve in the sutures.

He also called attention to the necessity of high ligation of the sac as being an important consideration in this operation in addition to the two points emphasized by Dr. Dowd; on this point there is practically universal agreement.

Dr. George Woolsey said that the fibres of the iliohypogastric which were found in the usual incision for this operation were sensory or trophic, not motor, and that they should not be included in sutures, but he doubted if they were important in preserving the muscular tone of the conjoined tendon.

Dr. W. A. Downes emphasized the importance of preserving the nerve as a possible factor in the prevention of recurrence of hernia. He thought that a neuritis or neuralgia being caused by the inclusion of the nerve in a suture was infrequent. He considered that a so-called double or saddlebag variety of sac, overlooked and unrelieved at time of operation, explained some of the recurrences, which were practically all of the direct type.

Dr. Dowd, in closing, said that Prof. G. S. Huntington, the head of the anatomical department of Columbia University, stated that the fibres of the iliohypogastric nerve were so given off that they should be preserved in this operation.—(E. H. H. O.)

LYLE, H. H. M. Aperiosteal amputation through the femur. *Ann. Surg.*, February, 1915.

This was a case presented before the New York Surgical Society. The original injury was a compound comminuted fracture of the ankle joint. Gas bacillus infection occurred and a Stephen Smith disarticulation was performed at the knee joint; this wound broke down and an aperiosteal amputation was done by Dr. F. S. Mathews through the junction of lower and middle thirds of the femur. As soon as the wound healed Hirsch's medico-mechanical exercises were begun and 14 days later the patient could bear his weight on the end of the stump. The case was presented to emphasize the importance of post-operative treatment of the stump, and the ability to produce a painless end-bearing stump in amputations through the shaft of femur. He conceded that the osteoplastic method was the ideal one under ideal conditions, while the tendino-plastic was of limited value. The periosteal method, while employed by many, was inferior to the other methods; while the aperiosteal, in the advent of complications in healing, was the only method likely to furnish a useful end-bearing stump.

In reply to an inquiry as to the technic employed Dr. Lyle said he removed the periosteum for one centimeter above saw line, and curetted the medullary canal for a similar distance. The stump was treated as follows: As soon as the wound healed the stump was massaged twice daily and after each treatment a two per cent solution

of salicylic acid in olive oil was rubbed in. At night the parts were bathed in a warm sodium bicarbonate solution and the stump protected with lamb's wool.

A box was placed at the foot of the bed and the patient instructed to press the stump against it for from 5 to 10 minutes, at first three times a day, then four times, and finally every hour, and after each treatment the hip was energetically flexed and extended. After this the standing exercises were begun, the patient resting the stump on a bran bag, at first placing the weight evenly on both legs and later resting all his weight on the stump. At the end of two weeks the patient should be able to wear a peg leg and later a permanent prosthetic appliance which directly receives the weight through the end of the stump. The exercises are abandoned after the patient begins to walk on the stump.—(E. H. H. O.)

McARTHUR, L. L. A modified incision for approaching the gall bladder. *Surg., Gynec. and Obst.*, January, 1915.

The author concedes that the best incision for operations on the bile tracts, or general surgery on the upper abdomen, is the perpendicular one through the right rectus as modified by Bevan. However, attention is called to the difficulty experienced in closing the posterior sheath of the rectus, which in this position is made up of the fibres and tendon of the transversalis, on account of the sutures giving way or pulling out, due to respiratory movements.

The modification proposed is incision of the posterior sheath parallel with the tendinous fibres of the transversalis; i. e., nearly transversely. This is advised only in cases of frank gall-bladder surgery, such as gall-bladder drainage, stone removal, etc. The level selected for this incision is about an inch above the free end of the gall bladder, making a small opening first for confirmation of the diagnosis. The incision is then enlarged to mid-line and laterally. When this layer is closed it will be found that the edges are readily brought into apposition without any tension on the sutures.

Mention is made of a refinement in the separation of the muscle fibres of the rectus. The handle of the scalpel is used beginning at the middle of the incision and worked above and below, thus pushing the nerves to the upper and lower parts of the wound and preserving the innervation of the muscle.—(E. H. H. O.)

JOCELYN SWAN, R. H., JONES, I., and McNEE, J. W. The occurrence of acute emphysematous gangrene (malignant edema) in wounds received in the war. *Lancet*, London, Nov. 14, 1914.

The journals recently have been full of remarkable testimony to a backward step in surgical asepsis. Despite all modern progress the base hospitals are encountering a wealth of septic cases as a sequence

of the continuous trench fighting. The three cases reported by the authors represent a condition common in the pre-Listerian era, but a rarity since the introduction of antiseptic surgery. Since the beginning of the war some 2,000 cases have been admitted to the Royal Herbert Hospital, but the disease appeared only in the two weeks prior to the author's reporting. In all three cases smears from the discharge bore spore-bearing organisms identical morphologically with the bacillus of malignant edema.

Among the important clinical manifestations are the blackish-brown, almost charred appearance of the wound; the abundance of a thin brown-colored serous discharge, in which microscopically much granular débris but comparatively few pus cells could be recognized (great numbers of other pathogenic bacteria were present in all three cases in addition to the spore-bearing bacilli); the curious heavy penetrating odor from the wound; the slate-blue color of the skin surrounding the wound; the presence of blisters containing brownish fluid over the area of dark skin in the case in which the gangrene had spread; the fine emphysematous crepitations in the tissues surrounding the wound; the marked toxemia in the two fatal cases.—(R. C. R.)

MAKINS, G. H. Note on the wounds observed during three weeks fighting in Flanders. *Lancet*, London, Nov. 21, 1914.

The author's prominence in military surgery makes his observations of particular value. The clearing hospitals at the front have proved of great value. They have lightened the load formerly carried by the field hospitals. Motor ambulances have fully justified themselves in the matter of rapidity and convenience, but inflict a severe amount of suffering to the badly wounded by their jolting. The ambulance trains have been well equipped and managed, many of the wounded arriving at the base hospital at Boulogne within 24 hours from reception of injury.

The wounds are largely of a very severe type as the fighting has been at comparatively short ranges, and ricochets are frequent in the trench fighting. The wounds of entry and exit vary somewhat from those made by the older rifles. One especially striking form is that in which the central round wound has a slit passing from opposite sides, suggesting that the original opening had been enlarged with a knife for purposes of exploration. Large stellate exit wounds are also numerous. The patients frequently state many wounds to have been produced by rifle bullets, which offer no resemblance to any type wound.

A remarkable case of multiple wounds from a machine gun is mentioned in which five parallel wounds pass fore and aft over left side of head and neck, the highest in the parietal region, the lowest at the root of the neck.

A considerable number of cases of gangrenous cellulitis are still encountered both at clearing and base hospitals. The advent of infection is not heralded by serious general symptoms, neither the temperature nor pulse rate rises very high, and there is little pain. The most striking features in the later progress are sleeplessness, the development of extreme anemia, and a peculiar slackness in the tension of the pulse. The patients meanwhile take their food well, smoke cigarettes, and make little complaint. Locally the first signs are rapidly increasing edema, at first white, later large patches of bronzy redness of unequal depth of tint develop, while at the upper limit crepitation is palpable. The bubbles of gas are often sufficiently large to raise an elevation which suggests on inspection a small varix. After two or three days the limb becomes gangrenous. "It is a very unusual surgical experience to have so frequently the opportunity of palpating surgical areolar emphysema as we have here. In one hospital the sign may be elicited successively in cases of wound of the trachea or lung, in cases of injury to the colon, and in limbs the subjects of emphysematous gangrene."—(R. C. R.)

HOPKINS, W. H. *The naval action off Helgoland.* Jour. Roy. Nav. Med. Service, i, No. 1.

For graphic description of the sensations experienced while at a battle dressing station during engagement, the following is recommended:

"The day was fine and calm, while the sun gleamed through a very hazy atmosphere, in which patches of fog shortened up the visual distance from time to time.

"I remained on the upper deck during the earlier part of the affair, and found it a most interesting and inspiring sight to watch our destroyers and the *Arethusa* and her divisions dashing at full speed after the enemy, while soon the frequent spurts of flame from their sides, the following reports, and the columns of water and spray thrown up by the enemy's shells pitching short or over began to create in most of us a suppressed excitement which we had not hitherto experienced, telling us that the 'real thing' had begun, that an action was actually in progress.

"Shortly our interest was to multiply fourfold, when the order to fire our own guns was given. After a time shells beginning to drop ominously near, I retired to my station, a selected spot just below water line in the after bread room, one of the few available places in a ship of this class (H. M. S. *Fearless*) where some of my party of first-aid men could be accommodated; the other half of the party in charge of the sick-berth steward being situated at a similar station forward. This period one found trying. For knowledge as to how matters were progressing we had to rely upon fragments of informa-

tion shouted down the nearest hatchway from some one in communication with those on the upper deck.

"The rat-tat-tat! rat, tat, tat, tat! on our side from time to time, as we got into the thick of it, told us plainly of shells pitching short and bursting, whose fragments struck but did not penetrate the ship's skin; it was a weird sound, occasionally varied by a tremendous 'woomp,' which once, at least, made the paymaster, who was reclining near me on a flour sack, and myself, look hard at the side close by us, where we fully expected, for the moment, to see water coming in. As a matter of fact this shell entered some 40 feet away, bursting on entry into the Lieut. Commander's cabin, while its solid nose finally fetched up in the wardroom, where later on it was christened 'our honorary member.' For this trophy I believe we have the *Mainz* or *Köln* to thank. The wardroom steward found a similar piece of shell in his hammock that night. It had penetrated the ship's side and a bulkhead, before finally choosing its highly suitable place of rest.

"The *Fearless* appears to have borne a somewhat charmed life—a large number of shells pitched just short and just over her—she was hit fair and square by seven, one of which played a lot of havoc with the middle deck, forward, and the mess gear there. Her sides showed some 23 holes of varying sizes, and yet her list of casualties was only eight wounded, none dangerously. She also had two narrow escapes from being torpedoed, one torpedo passing just forward from an unknown source, and another aft from a submarine.

"During comparative lulls I went on the upper deck once or twice, to visit the forward station and to see that all was correct. For suppressed excitement and vivid interest, I should say the seeker after sensation could scarcely ask for more than a modern naval action."—(R. C. R.)

HYGIENE AND SANITATION.

C. N. FISKE, Surgeon, and R. C. RANDELL, Passed Assistant Surgeon, United States Navy.

Massachusetts Association of Boards of Health. Report of question meeting. Am. Jour. Pub. Health, iv, No. 12, December, 1914.

Question No. 2 was entitled "Of what value is house fumigation after infectious disease?" The discussion was opened by Dr. C. V. Chapin, of Providence, R. I., as follows:

"For a dozen or 15 years previous to 1900 I tried to disinfect houses in the best possible manner. We were the first city to use a steam sterilizer. We abandoned sulphur and used formaldehyd about as soon as anyone, and continued this up to about 1900. Then I began to ask the question which has been propounded to-day: What good is disinfection? Why do we disinfect? I was led to ask

this question largely because we had begun to learn two things: One, that germs die pretty quickly after they leave the body, and the other that the unrecognized cases and carriers are the chief cause of the spread of infectious disease. After considering the question for some time, I made up my mind that there were two reasons why we disinfect. One reason is the same reason that we sew buttons on our coat sleeves—because our ancestors have done so for several hundred years. The only other reason offered is this: That one occasionally finds a physician, a health officer, or an old woman who says that little Johnnie caught the scarlet fever because he played with a toy belonging to some other child who died of scarlet fever a year or two before.

“No one that I know of ever offered any real proof of the value of disinfection. It seemed to me that the best way to find out was to give up disinfection, and see what happened. So we abandoned disinfection after diphtheria in Providence in 1904. We have had no more recurrences of the disease since then than before. Both before and after giving up disinfection we found recurrences after the termination of isolation in between 1 and 2 per cent of the cases. I became so well satisfied that disinfection, so-called, was of no use that later we gave up disinfection after scarlet fever. The result was the same. The number of recurrences after we gave it up was practically the same as before. You might perhaps say that our method of disinfection in Providence was not good and that I am simply comparing a period of poor disinfection with one of no disinfection. But the city of Baltimore has been very careful about disinfection and tests by means of cultures, and if it is not efficient they send the man back to do it again. There recurrences are about the same as ours. Another way to test the value of disinfection is this: We send away many children from diphtheria and scarlet fever houses when the disease is recognized and the house placarded, and we keep them away until the period of isolation has terminated and then let them come back. Now, if the house is very infectious, they ought to contract the disease. About eight-tenths of 1 per cent of several hundred children brought back to diphtheria houses while we practiced disinfection contracted the disease. After we gave up disinfecting it was only five-tenths of 1 per cent. About the same thing happens in scarlet fever. Now, it is worth while to consider what happens when children, as soon as the disease is recognized, are taken to a hospital, in both scarlet fever and diphtheria, and particularly in the latter disease. After they return home from the hospital they at times cause infection in the family. They go home at about the same period of the disease at which isolation would have terminated if they had stayed at home. Coming back at this time, there are always a certain number of reinfections or recur-

rences in the same family. In such cases it is almost certain that the child from the hospital is the cause, and not infection remaining in the house. It certainly is the child who comes from the hospital that does the harm. If in such cases it is the child and not the house that causes the infection, have we any ground for assuming that it is the house which causes the infection when the disease recurs after home isolation? I think we can believe that the house and the things in it are negligible factors in the recurrence that takes place after the termination of isolation. You may argue that the recurrences mean little because most of the susceptible children of the family have been affected before the disease is recognized or within a few days thereafter. But we have still another way of learning whether disinfection does any good. Does disease increase in the community when it is omitted? It did not in Providence; for a few months after we gave up disinfection for diphtheria there was a time when we did not have a case in the city. There has been no more scarlet fever and diphtheria in Providence since we gave up disinfection than there has been in other New England cities."

In the subsequent discussion it was stated that it was impossible to judge of the value of disinfection after tuberculosis, on account of the slowness with which the disease develops. Dr. Wm. C. Woodward, of Washington, had "published data which on their face indicate that disinfection is of great value after tuberculosis."

Dr. Gardner T. Swartz, of Rhode Island Board of Health, emphasized that sulphur fumes were ordinarily not destructive to bacterial life, and that in order to render formaldehyd gas effective it must operate under a definite pressure, temperature, and humidity, conditions which in practice were rarely obtained; he asked: "Since none of these methods are effective, why go through these motions and produce a fake sense of security when we know all the time that the infectious material is maintained longer in the throat of the patient than in the atmosphere outside?"—(C. N. F.)

AHLBORN, K. The disinfecting properties of gaslight on air of room. Arch. f. Hyg., Bd. 83, Hft. 3 u. 4.

The author quotes the work of Lewes, Rideal, and Cooper on this subject, and amplifies their results. Lewes stated that not only are the abundant pathogenic bacteria of the air killed by actual burning, but they are also destroyed by the small amount of sulphuric acid elaborated in the process of combustion. Rideal observed that bacterial growth was less with gas or electric light than in an unilluminated room, and that the reduction was greater with gas than with electricity.

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The author undertook an interesting line of experiments with the following summary of results:

There is an appreciable effect of gaslight on the bacterial content of the air. In a room of 57.1 cubic meters the count fell from 100 to 76 per cent in one hour without gas, with gentle uniform natural ventilation; in a similar period and conditions, but with three large gas jets burning the count fell from 100 to 40 per cent, a 16 per cent greater reduction.

These results are to be traced either to burning of the micro-organisms by the heated carbon particles or destruction by the heated gas.

The results obtained, however, indicate no practical value as a disinfecting method for the air of the room.—(R. C. R.)

FRANK, L. C. Sewage disinfection for vessels and railway coaches. Public Health Reports, xxx, No. 1.

The danger of disease transmission through human excreta from vessels plying on lanes of fresh-water travel, where within a very short time after one steamer has discharged toilet wastes another steamer will pass over the same spot and may take in drinking water, or where these lanes of travel pass close by drinking water intakes of large cities, as on our Great Lakes, and, probably even more serious, where railways pass over watershed areas, has suggested to the author the following disinfection chamber, which can be adapted to either type of conveyance:

An insulated tank has influent and effluent pipes for the sewage, the effluent being an inverted U reaching above the level of the tank. Near the bottom of the tank a small steam pipe has entrance, its supply controlled by a lever arm rising and falling with the height of the surface of water. As the chamber fills with flushing water and sewage, the float, rising with the surface of the fluid, opens the steam cock, allowing ingress to the steam, which disinfects the contents and, as the pressure increases, drives the contents out through effluent pipe, the cock being automatically closed at end of this process by falling of float with surface of tank contents.

The results of tests showed a total count of 11 bacteria per c. c., and a total absence of *B. coli* in 100 c. c. The eleven bacteria which did develop were probably spore bearers.

Preliminary studies of cost of operation indicate that with steam as a heating agent the disinfection of one steamer closet flush will cost \$0.001, or \$1 per thousand closet flushes.—(R. C. R.)

CRAIG, C. F. *The prophylaxis of malaria with special reference to the military service.* War Department; Office of the Surgeon General. Bulletin No. 6, August, 1914.

The author presents an admirable 115-page monograph. Chapter 1 is devoted to the morphology of the plasmodia, with some brief notes on laboratory methods. Chapter 2 gives the life cycle and habits of the anophelinæ, and the methods of collecting and dissecting mosquitoes.

Chapter 3 discusses prophylactic measures based upon the destruction of malaria mosquitoes. This is the ideal method when practicable, but the most we can hope to accomplish, especially in the Tropics, is to reduce greatly the number of the insects, and other methods of prophylaxis must be used in conjunction with the destruction of the mosquito. Leveling, draining, and clearing, if carried out in an efficient manner, are the most valuable measures that we possess, and in the vast majority of instances are capable of greatly reducing, if not almost eradicating, malarial disease. The unlined open drain is frequently a mosquito breeder. Subsoil drainage with tiles is the most efficient method we have, and less expensive in the end. Filling in of low ground and removal of such shelter as shrubbery, vines, long grass, brush, etc., are of great assistance.

L. O. Howard first suggested the use of kerosene as a larvacide in 1893. An oil composed of four parts of oil of 18° gravity and one part of oil of 34° gravity is recommended by Quale, who found that it remained efficient for from three to four weeks after application. The best rule is to reoil every two weeks, as we know that the average life of the larvæ is from 10 to 14 days. Where currents or profuse vegetation interfere with the above, the Canal Zone larvacide (formula given) is used. One part is added to five parts of water and sprayed. It will kill within five minutes, and possesses the advantage that after a few hours, in case of running streams, the water will be again fit for domestic use. The cost of its use is much less than that of oil. The use of fish in preying on the larvæ is at best a very imperfect method and possesses little of value for the military sanitarian.

The abolition of breeding places in and about quarters forms one of the most important duties of sanitary officers in localities where malaria is endemic. Receptacles that must contain standing water, such as fire buckets, need but be emptied as routine once a week, since, as mentioned above, the larvæ do not mature under 10 days. They have been known, however, to exist six days in mud, so care should be taken to empty where quick evaporation is certain.

Fumigation by sulphur is recommended as the most valuable agent in quarters, barracks, or ships. Dense smudges may be of value in the field. Pyrethrum is of little value from a military standpoint.

Mosquito catching is a very valuable adjunct to the other methods, and is capable of keeping the incidence of malaria down to a very low figure, even in hotbeds of the disease. The use of the chloroform tube, the "fly swatter," and the trap are advised. The most unskilled labor can be used.

Chapter 4 discusses prophylactic methods based upon the protection of man from the bites of mosquitoes. This mechanical prophylaxis, as it is sometimes called, is secured by the proper screening of quarters and barracks, the use of mosquito nets for the beds and shelter tents, the wearing of head nets and gloves, and the use of various odorous substances which are smeared upon the skin for the purpose of preventing mosquitoes from biting.

The material for screening should be of wire, composed of copper, zinc, and iron, the copper content being higher than that of brass. In the Tropics this is of special importance, as the heat and moisture rapidly corrode wire netting having a low percentage of copper. All screening should contain at least 18 meshes to the linear inch, and the author believes it a mistake to use wire gauze containing more than that number, both because it is unnecessary, so far as practical protection goes, and because it reduces by just so much the amount of air admitted to a room or building.

Two odorous compounds for skin use are mentioned and mildly recommended; one is oil of bergamot with kerosene, in proportion of 16 to 1; the other, oil of citronella with vaseline. If liquid vaseline is used as a base the proportion is 6 to 1.

The fifth chapter, on quinin prophylaxis, contains the following:

"In conclusion, it may be stated that in quinin prophylaxis we possess a most valuable method of preventing malarial infections, and one that can be easily applied in the military service, but it should not be used to the exclusion of the more permanent methods depending upon the destruction of the mosquito, where such methods can be instituted. Although, as Celli says, 'those who take quinin daily, having a certain quantity of it in the circulating blood, can fearlessly subject themselves to the inoculation of blood loaded with h emosporidia, and, with much less danger, to the biting of infected anopheles,' the method requires the most careful supervision, is more or less disagreeable to the individual, and is less permanent than the abolition of breeding places of the insects transmitting the disease. In the military service its greatest use will be found in the protection of troops in active operations in the field in malarial regions, and as an aid in the prophylaxis of the disease in camps and posts in conjunction with the other prophylactic measures described."

The last chapter is devoted to the application of the above methods to the military service, embracing prophylaxis in the field, in semi-

permanent camps, and permanent camps. Emphasis is laid upon great care in selection of permanent camp sites in the way of mosquito survey, and search for latent infections.—(E. C. R.)

TROPICAL MEDICINE.

E. R. STITT, Medical Director, United States Navy.

ROBERTSON, W. Benzol in bilharzia. Brit. Med. Jour., December 19, 1914.

Dr. Robertson reports that he has recently had a case of bilharzia under treatment, for five or six months, with sulphur, urotropin, male fern, and methylene blue, without improvement.

After the administration of benzol the ova appeared black in color and much shrunken. The ova varied from one or two of normal appearance to dense black.

Ova on a slide tested with benzol soon develop a faint blackness like that seen in some ova passed in urine.

Two weeks of the benzol treatment caused all constitutional symptoms, renal colic, pain in back, frequent urination, etc., to disappear. The urine became more normal in color than patient had seen it in seven years. It still throws down a sediment on boiling, though no casts are present.

Robertson finds that the very heavy exudate seen on boiling the urine of a fresh case of bilharzia may become a mere haze after brief treatment with thymol-benzol.

Cystic hemorrhage is unaccompanied by the formation of clots, consequently the urine passes freely.

One case that passed more or less blood for years passed none whatever for 14 days, when put on thymol-benzol. In another case the patient gained weight rapidly and improved surprisingly in color. At first Robertson gave benzol drams 1 on sugar every three hours, but recently he has been giving thymol grains 2, benzol drams $\frac{1}{2}$, every four hours with most gratifying results. He recommends thymol-benzol for three or four weeks and then substitution of urinary antiseptics for a time, with return to thymol-benzol if necessary.—(E. L. WOODS.)

BASSETT-SMITH, P. W. Kala-azar and allied infections. Brit. Med. Jour., December 19, 1914.

The author notes that while the bedbug is not definitely known as the true carrier of kala-azar, yet measures for the eradication of the disease along lines of destruction of a nonflying insect have been very successful.

He refers to the finding of leishman bodies in the feces by Critien and considers that such material, as well as blood, may be a source

of infection. Whatever may be the infecting material, all modern research indicates that the organism must pass through an extra-corporeal phase.

Reference is made to the evidence that the Indian, Chinese, African, and Mediterranean forms of the disease are identical, the points of differentiation as to age, cultural characteristics, and infectivity of animals having gradually broken down.

He notes that clinically the appropriateness of the term *Leishmania infantum* is no longer tenable, there having been recently brought to the attention of the Royal Society of Medicine a case of a typically affected child of 5 from Calcutta, and at the same time a man of 29 who had contracted the disease in Malta.

This latter case was in one who had been employed on the rifle range at Malta for about six months. Of importance from the standpoint of the view that the dog acts as a reservoir for the virus of Mediterranean leishmaniasis, is the statement that the camp where the man lived had three dogs in constant attendance, one of the canines becoming thin and unhealthy during this period.

The patient had a greatly enlarged spleen and somewhat less enlarged liver, together with a leukopenia and anemia. Splenic as well as liver punctures showed the presence of leishman bodies.

The man was treated with intramuscular injections of atoxyl (three to five grains) twice weekly, together with an autogenous vaccine of his flagellates. Under this treatment the man has regained his former weight and the spleen has become much smaller, together with a normal blood picture and freedom from fever.

Cases with marked cachexia show a very low systolic pressure and extreme diastolic pressure of the pulse.

He notes that injections of salvarsan and neosalvarsan have not given success and that injections of large doses of quinin are of doubtful benefit.

As regards the American forms of cutaneous leishmaniasis, he notes that the involvement of the mucous membranes is not peculiar to them, but has been found in similar conditions in southern Italy and Sicily.—(E. R. S.)

FOSTER, W. D. Observations on the eggs of *ascaris lumbricoides*. Jour. Parasit., September, 1914.

The fact of the remarkable variation in the shape of ascaris eggs does not seem to be sufficiently well known, and the author gives a cut of an atypical egg with a narrow elliptical outline instead of the broad oval of the average egg. Such eggs are thought to be the product of unfertilized females.

An interesting observation is that although greatly varying in length, yet the diameters of such elongated eggs do not show a decrease from those of normal eggs.

In his measurements of over 200 eggs he noted lengths of from 62 to 87 microns and breadth of from 46.5 to 59 microns.

NOTE.—Brumpt gives 50 to 75 microns as length and 40 to 60 microns as breadth. Braun gives 50 to 70 microns as length and 40 to 50 microns as breadth.—(E. R. S.)

PATHOLOGY, BACTERIOLOGY, AND ANIMAL PARASITOLOGY.

C. S. BUTLER, Surgeon, and A. B. CLIFFORD, Passed Assistant Surgeon, United States Navy.

WENYON, C. M., and LOWE, G. C. The occurrence of certain structures in the erythrocytes of guinea pigs and their relationship to the so-called parasite of yellow fever. Jour. Trop. Med., December 15, 1914.

The authors state that Seidelin, Macfie, and Johnston believe that they have been able to transmit the so-called parasite of yellow fever to guinea pigs. (*Paraplasma flavigenum*.)

The writers have found the same bodies in guinea pigs which had never been inoculated or exposed to infection. They employed the same artist, who had made drawings for Seidelin, and used practically the same methods of staining.

They come to the following conclusions:

(1) In the blood of normal guinea pigs, born and bred in England, are to be found bodies indistinguishable from the so-called *Paraplasma flavigenum* of Seidelin.

(2) In most cases these appear to be definite structures which probably have to do with the development or degeneration of red cells.

(3) They are not parasitic, because they occur in the blood of newly born animals, not forgetting even the possibility of placental transmission.

(4) The apparent success of the inoculation into guinea pigs of such bodies from yellow-fever cases is due to failure of a sufficient examination of control animals.

(5) The evidence in favor of the yellow-fever bodies being parasites thus breaks down.

(6) The presence of such bodies in yellow fever bears, therefore, no diagnostic significance apart from the evidence of blood alteration.

(7) It is frequently impossible to separate real bodies from pure artefacts, a fact which renders their differentiation one of extreme difficulty.—(G. F. CLARK.)

STEWART, M. J. Observations on myeloid sarcoma with an analysis of 50 cases. Lancet, London, November 28, 1914.

The writer quotes the views of various authors. Some believe, as does he, that myelomata are only malignant locally, and are not to be confused with true sarcomata, showing giant cells, but that, like other tumors, they may become malignant.

Other authors consider that myelomata are distinctly sarcomatous, but they seldom cause secondary growths.

Of the 50 cases, 35 are from jaws; 11 from long bones; and 4 from other situations. The average age for long-bone cases was 34 years; for jaw cases, 20.6 years.

Of 11 long-bone cases, 9 are living and well, after either conservative operation or amputation; or conservative operation followed by amputation.

Of the 35 jaw cases, 29 were traced. Of these, 4 had recurrences, but 3 of the 4 responded to another operation. The fourth died.

The writer gives a good description of the histopathology and shows some very excellent microphotographs and drawings.

SUMMARY OF CONCLUSIONS.

"Myeloid sarcoma is locally malignant only and does not undergo dissemination. It is to be clearly distinguished, both clinically and pathologically, from malignant giant-cell sarcoma, in which death with visceral dissemination is the rule, even after the most radical operative treatment.

"The histological diagnosis is based on the morphological characters of the giant-cells, especially as regards their nuclei. In myeloid sarcoma the latter are numerous, uniform, small and without mitoses; in malignant giant-cell sarcoma they are few, sometimes single, irregular, and often very large, while mitotic figures are frequent. After investigating this comparatively large series of cases, and from a study of the literature, I feel bound to advance a strong plea for the conservative treatment of myeloid sarcoma. Especially would I advocate thorough curettage as the operation of choice in the first instance in suitable cases; failing this, a local resection of the growth. Amputation should be the last resort, and only after a failure of less radical measures. An accurate histological investigation of the tumor is in all cases essential."—(G. F. CLARK.)

PETROFF, S. A. A new and rapid method for the isolation and cultivation of tubercle bacilli directly from the sputum and feces. Jour. Exper. Med., Jan. 1, 1915.

The lack of uniformity of results with usual methods for cultivating *B. tuberculosis*, together with the advantageous use of various dyes upon the growth of microorganisms by several workers, led the author to use some of these dyes in trial for a more satisfactory and uniform direct culture procedure.

After trial he found that NaOH solutions were of advantage in inhibiting the growth of contaminations and that solutions of 1, 2, 3, and 4 per cent of NaOH would not destroy *B. tuberculosis* when applied for 24 hours at 37° C.

After experimenting with various dyes in varying dilutions gentian violet was selected as the most favorable because it inhibited many organisms.

Further experimentation led the author to adopt the following medium, as it gave uniformly positive results:

"Two parts of egg (white and yolk).

"One part of meat juice.

"Gentian violet sufficient to the proportion of 1 to 10,000.

"*Meat juice*.—500 gm. of beef or veal are infused in 500 c. c. of a 15 per cent solution of glycerin in water. Twenty-four hours later the meat is squeezed in a sterile meat press and collected in a sterile beaker.

"*Eggs*.—Sterilize the shell of the eggs by immersion for 10 minutes in 70 per cent alcohol or by pouring hot water upon them. Break the eggs into a sterile beaker and after mixing the eggs well, filter through sterile gauze. Add one part by volume of meat juice.

"*Gentian violet*.—Add sufficient 1 per cent alcoholic gentian violet to make a dilution of 1 to 10,000.

"Tube about 3 c. c. in each sterile test tube and inspissate for three successive days; on the first day at 85° C., until all the medium is solidified, changing the place of the tubes if necessary; on the second and third days for not more than one hour at 75° C. For the bovine type omit the glycerin and infuse the meat for the 24 hours in water. Bovine tubercle bacilli grow in this medium even if it contains glycerin, but on account of the popular belief and the lack of data we used a medium without the glycerin."

By calculation it appeared that it would take single organisms (*B. tuberculosis*) six days to grow to visibility (pin-point colonies). Experimentation by planting single organisms, isolated by Barber's method, at various places on the medium confirmed the calculation. Under favoring conditions six days are required to grow a visible colony.

Fresh sputum is advisable. Five c. c. of sputum is shaken up with 5 c. c. of 3 per cent NaOH sol. and left in the incubator for an hour or so until well digested. Neutralize to sterile litmus paper with N/1 HCl and centrifugalize. Pour off and plant the sediment upon several tubes of the medium described. A series planted in this medium and controlled by tubes of the same medium with the gentian violet omitted showed that the dye aided greatly in preventing contamination.

Time of appearance of growth was not uniform with different specimens. Some took seven days while others from 12 to 14, but never longer. All were microscopically positive in nine days. Some were small pin-point colonies, others large and flat. Morphologically in their action towards the dye there was also great variation. The

author has by this method isolated *B. tuberculosis* from 69 consecutive specimens of sputum. Six specimens which were negative to careful microscopical examination proved positive by this culture method. The isolating of *B. tuberculosis* from feces is more difficult on account of sporing bacteria there present. A morning specimen of feces is collected and after mixing with 3 volumes of water is strained through several layers of gauze. It is saturated with NaCl and left to stand undisturbed for one-half hour. At the end of that time all bacteria are floating. This floating film is then skimmed off with a deflagration spoon into a wide-mouthed bottle and an equal volume of N/1 NaOH added, the whole shaken, left at 37° for three hours, shaking at end of each hour. Then neutralize to litmus paper with N/1 HCl and plant sediment as in case of sputum. Growth from feces appears more slowly, taking two to three weeks to make its appearance. Probably many of the bacilli passed in feces are dead.

Of 32 specimens of feces studied, 19 were positive, six were contaminated, and seven were negative.—(C. S. B.)

GUTHRIE, A. C. Appendicitis treated with anticolon bacillus serum and vaccine. Brit. Med. Jour., January 9, 1915.

The possibility of appendicitis being due in some measure to infection with *B. coli communis* suggested to the author that the serum and vaccine of the colon bacillus might be of service in this affection.

He has tried it in 22 cases, and reports 1 case as a typical example.

Most of the cases were in the acute stage, and all recovered without operation.

He was struck particularly by the wonderful effect of the serum in causing complete relief from pain, a feeling of well being and hopefulness of recovery.

The author states that the serum should be used in the first stage when the pain is general, due to involvement of the sympathetic nerve, when the mucous membrane is affected. Later when the muscular and serous coats are involved the eighth to tenth dorsal nerves are implicated and the pain is localized in the iliac region.

The author gives 20 c. c. of anticolon bacillus serum; 10 c. c. subcutaneously first in the right and then in the left hypochondriac region. A few days later he gives 100 million colon bacilli vaccine in the deltoid region. This is to prevent recurrence.

As other organisms than the colon bacillus may be the cause of the disease, he recommends trying the complement fixation test with the patient's serum, and the most probable organism (*B. coli*, pneumococcus, streptococcus, etc.).

The author suggests that the serum probably acts chiefly as an antitoxin, also as a counter irritant, causing local leukocytosis.

That it has also a physical effect, changing the equilibrium in the surrounding fluids, and thereby producing increased osmotic pressure and favoring phagocytosis of the bacilli has been shown by Leduc.—(A. B. C.)

MUIR R., and DUNN, J. S. *The retention of iron in the organs in hemolytic anemia.* Jour. Path. and Bacteriol., January, 1915.

The authors, in previous work on hemolytic anemia, found that an enormous destruction of red corpuscles might occur in a short period of time, while the amount of hemoglobin passed in the urine might be comparatively small.

They noted that in all cases of anemia experimentally produced there was a well marked hemosiderin reaction in the liver, spleen, and kidneys, but it could not be said to what extent this represented the hemoglobin that had been lost from the blood.

They determined to investigate the matter by making quantitative estimation of the iron in the organs of the anemic animals as compared with normal animals.

The results not only yield information as to the disposal of the iron, but also, owing to the comparatively short course of the anemia, throw a striking light on the rapidity with which iron can be stored up in the organs.

Rabbits were rapidly rendered anemic by the intravenous injection of an antiserum obtained from the goat, which had been treated with injections of rabbits' corpuscles.

When the anemia was sufficiently severe the animal was killed by bleeding, under an anesthetic, and the circulation washed out with citrate salt solution and the blood volume ascertained. The organs thus rendered blood free were removed, dried to constant weight, and the iron in them estimated.

The iron derived from the hemoglobin lost from the blood may be disposed of in two ways. It may be retained in the organs or it may be excreted in the urine or feces.

Any excess in the urine can be easily detected as the daily amount is relatively constant and does not exceed 0.5 mgm. a day. The amount in the feces varies so much with the amount ingested that they abandoned the estimation of the iron passed through the intestine.

They first determined the amount of iron normally present in the organs; also the amount in a cubic centimeter of blood.

As the fall of hemoglobin was observed throughout the experiments, and as the blood volume was known, the total amount of iron lost from the blood was readily calculated. The amount of iron in the organs after hemolysis was easily estimated, and this compared with the amount lost from the blood. We thus obtain

knowledge as to the proportion of iron which is stored in the organs and also as to the rapidity with which this can take place.

Their conclusions are:

1. In acute hemolytic anemia, attended by destruction of more than half the blood within three days, nearly all the iron from the destroyed hemoglobin is deposited in the liver, spleen, and kidneys; a certain amount escapes in the urine when there is hemoglobinuria, and the amount deposited in the kidneys is roughly proportional to this.

2. A third of the total iron of the blood may be deposited in the organs mentioned within twenty-four hours.

3. With regard to the deposits of hemosiderin, a broad distinction can be made between that resulting from lysis and that resulting from phagocytosis of red corpuscles.—(A. B. C.)

CHEMISTRY AND PHARMACY.

E. W. BROWN, Passed Assistant Surgeon, and O. G. RUGE, Chief Pharmacist, United States Navy.

LAWALL, C. H. and FORMAN, L. The analysis of emulsions. Merck's Report. December, 1914.

The authors describe a simplification of a process, published in Bulletin 132, Bureau of Chemistry, United States Department of Agriculture, for the analysis of emulsions. Their modification enables anyone with very limited facilities to do such work and for that reason has a peculiar value for us aside from the difficulty of finding any such process described in the usual books of reference. The method is as follows:

Prepare a mixture of the emulsion in distilled water, so that each 100 cc. of the liquid contains 40 gm. of the emulsion. Take two 100 cc. graduated cylinders and in one place 10 cc. of the diluted emulsion, and in the other place 5 cc. of the diluted emulsion and 5 cc. of water. To each cylinder then add the following reagents in the order named, agitating thoroughly after each addition:

- 1 cc. stronger ammonia water.
- 10 cc. alcohol, U. S. P.
- 25 cc. ether, U. S. P.
- 25 cc. petroleum benzin, U. S. P.

After the addition of the petroleum benzin, the agitation should be continuous for 10 minutes, after which the cylinders should be allowed to stand until the liquids have separated into two layers with a sharp dividing line (this requires from 15 minutes to 1 hour).

After this, having observed the exact volume of the upper layer, draw off exactly one-half and transfer to a flat-bottomed glass capsule and evaporate quickly on a water bath to constant weight. In one of the duplicates the resulting fat will be from 2 gm. of the emul-

sion, in the other from 1 gm., which gives a satisfactory check upon the thoroughness of the extraction.

After the separation has been accomplished, such constants as saponification value, iodine number, and refractive index can be readily determined with a degree of accuracy closely approximating that of work done on original oils. The authors state that their method will give not only satisfactory quantitative estimations of fat, but also permits of the determination of those constants necessary for identification.—(P. J. WALDNER.)

GORDIN, H. M. and KAPLAN, J. Notes on the estimation of morphin and Lloyd's reagent. Merck's Report, December, 1914.

The authors describe several processes which appeared practical in theory but proved useless in practice. (1) Their attempt to remove morphin from a solution of its salts, in water, with alcohol or a mixture of alcohol and water, by saturating the solution of morphin with potassium carbonate and shaking out, gave altogether unreliable results. This experiment was based on the fact that alcohol is immiscible with a saturated solution of potassium carbonate. (2) Extraction of alkaloid by means of Lloyd's reagent. The effectiveness of this precipitating reagent for alkaloid could not be utilized for purposes of extraction from the original sources of the alkaloid nor from prepared solutions of their salts. The difficulty lay in the final separation of the alkaloid from the whole precipitate. The yield after the most careful methods of separation averaged about 90 per cent of alkaloid originally present. The third experiment dealt with a novel and most interesting method resorted to for the purpose of facilitating the removal of strychnin from a precipitate obtained by Lloyd's reagent. This precipitate, strangely, is said to be almost tasteless, although it contains all the strychnin formerly held in solution and is said to act physiologically very much like strychnin diluted with an inactive substance. The absence of taste led the authors to believe that the reagent forms with the strychnin an exceptionally stable compound, and the fact that it has physiological activity led to the further belief that the digestive processes in the living being disrupt the union of alkaloid and reagent.

Digestive experiments *in vitro* with pepsin, ptyalin, and trypsin, however, showed that these ferments have no disrupting effect.—P. J. WALDNER.)

Merck's Annual Report of Recent Advances in Pharmaceutical Chemistry and Therapeutics. Vol. XXVII.

This volume reviews and discusses the literature pertaining to recent therapeutic preparations and the many advances made in pharmaceutical chemistry and therapeutics during the year 1913.

The leading articles in this report are "Nuclein and nucleinic acid" and "Preparations used for radiographic examinations." Under the latter heading no less than 13 substances have been given consideration, barium sulphate, undoubtedly the preparation most used at present, being discussed quite fully. The report also contains brief excerpts on a varied list of preparations and drugs on which reports were made during the previous year. The reports from which citations are made cover a wide field of literature and embrace many countries. The journal or paper from which the excerpt is made is noted, as well as the author in question.

The following extracts which may prove of interest are taken from the report; they appear under the chapter "Preparations and drugs":

Apomorphin: Attention has been drawn to the possibility of the formation of apomorphin on boiling solutions of morphin during sterilization, such possibility having been suggested by the vomiting sometimes occurring after injections of sterilized solutions of morphin. Exhaustive investigation by Feinberg proved that no formation of apomorphin takes place even on boiling solutions of morphin or liquids containing morphin.

Atropin sulphate: The use of atropin in gastric affections is favorably commented upon; and of interest is the experiment of Fischer, who was led to try the effect of atropin on 52 passengers severely ill with seasickness during a rough voyage at sea. The men were given subcutaneous injections of one sixty-fourth grain and the women one-ninetieth grain of atropin sulphate. The effect is reported as striking. All symptoms of seasickness disappeared rapidly and no relapse occurred, in spite of the sea becoming rougher.

Benzin: The use of benzin *per se* or in combination with iodin for cleansing and disinfecting the skin before operations has resulted in reports calling attention to the fact that benzin has a caustic action, especially if its evaporation is retarded. The caustic action of benzin sets in almost immediately, and Sehrwald made investigations with a view of thus using benzin therapeutically. He states that where a slight or pronounced irritation of the skin is desired benzin may be used, provided its application is carefully supervised, in the place of mustard paper, plaster of cantharides, etc. Its property of causing necrosis may be used to cause the disappearance of superficial cutaneous growths, but its application should be carefully localized and the benzin not allowed to act longer than necessary. The use of benzin for disinfection prior to operations requires caution.

Cocain hydrochlorid: That alcohol is an excellent drug for preventing acute cocain intoxication is stated by Herzfeld. Every

patient is given 25 to 50 c. c. of whiskey or brandy by mouth 10 to 30 minutes before the first injection of cocain. No unpleasant experience has occurred during several years of such treatment.

Emetin hydrochlorid: The favorable comments on the use of emetin in amebic dysentery by noted authorities are many and quite conclusive as to results. The conclusions of Baermann and Heinemann in the treatment of selected cases are quoted in full. Attention is also called to experiments made with emetin in hemorrhage and hemoptysis, based on the fact, long known, that *ipëcacuanha* displays a styptic action on internal hemorrhages. Striking successes are reported by one author who injected emetin subcutaneously in tuberculous hemoptysis. It is stated that in almost every case the hemoptysis can be checked, in some cases permanently. No explanation for this action of emetin is offered.

Ether: The successful use of ether as a preventive of infection in wounds and operations is noted from a report by Souligoux. As specially deserving of attention is its use in peritonitis, several authors reporting results in complicated cases. For combating postoperative peritonitis Temoïn considers ether the most reliable agent.

Iodin: The popularity of tincture of iodine for disinfecting the skin before operations is abundantly proved by reports noted. A modification of Grossich's procedure as used by Reich-Brutzkus in 100 cases is as follows: "The field of operation was painted with a solution of 3 grammes of iodine in 10 grammes of absolute alcohol and 90 grammes of chloroform, which was allowed to act for at least 5 minutes, after which the skin was rubbed with alcohol (96 per cent)." Compresses impregnated with solution of mercuric chlorid should not be applied to the skin before painting with iodine; this to avoid the possibility of iodid of mercury forming and causing irritation.

Kaolin, sterilized: Burmeister recommends the use of kaolin when using rubber gloves during operations. His procedure is as follows: "After sterilizing the gloves in the usual way they are placed in sterile water or in solution of mercuric chlorid, and the hands are also disinfected as usual. Thereupon the hands are rubbed with sterile water and kaolin until they are covered with a coating of kaolin paste, over which the wet gloves can be easily drawn. The gloves are cleansed with sterile water to remove the kaolin paste deposited on the outside of the gloves while drawing them on." The gloves are said to fit closely, with no air or water bubbles, and can be removed without difficulty or damage. Maceration of the hands is also retarded by the coating of kaolin.

Paraffin liquid: The antiseptic and healing properties of liquid paraffin are favorably commented upon; especially surprising were

the results obtained with its use in bedsores. One author reports its use in the Balkan War on 600 wounded, remarkably speedy cures being effected in treating suppurating wounds with liquid paraffin.

Phenol-camphor: Prepared by mixing 30 parts of phenol, 60 parts of camphor, and 10 parts of alcohol. This remedy was recommended by Chlumsky as a noncaustic remedy for the treatment of erysipelas. Its good action has been confirmed by others and it is now stated to have proved a specific in erysipelas. Its application is simple, consisting in painting the affected parts as well as the contiguous area with the preparation. Where the affected area is extensive, compresses with the solution are applied and these are changed several times daily according to the severity of the affection. In spite of the large amount of phenol present this mixture has no irritant action and the same can be applied undiluted to wounds and fistulas.

Potassium permanganate: Beck proposes the use of permanganate of potassium for treating severe burns because it displays a powerful disinfectant action on account of its oxidizing properties and removes the toxins from the burnt portions of tissue. In his opinion the moist treatment of burns is preferable to treatment with powders and ointments. His procedure is as follows: All blisters are snipped and the raised epithelium is removed. The patient is then placed in a bath with a temperature of 33° to 34° C. for from 5 to 30 minutes, depending upon the patient's condition. After the bath the patient is placed in bed, on waterproof sheeting, and the burnt parts of the skin are covered with several layers of gauze which has been dipped in a solution of potassium permanganate 1:4000 or 1:3000. To prevent evaporation the gauze is covered with waterproof material; about every half hour the gauze is moistened with a fresh lukewarm solution of the permanganate. If the patient's physical condition warrants it he may take two potassium permanganate baths daily—the patient remaining in the bath 30 or 40 minutes. To avoid painful handling the patient is placed in the bath with dressings on, which readily come off in the bath. The object of the permanganate treatment is to allay the inflammatory symptoms, enable the unhindered discharge of the wound secretions, eliminate the toxic products produced by the burning, and to cleanse the surface of the wound.

Thymol: For the disinfection of the field of operation H. Kohler states that an alcoholic solution of thymol presents several advantages over the now much used tincture of iodin, which make it especially useful in military medicine. In the first place it is less irritating, even to the scrotum and perineum, does not lead to idiosyncrasy, and in operations for goitre and Graves's disease is not followed by absorption of iodin, and in inflammatory processes such as lupus, hematoma and nevi does not interfere with the clinical

picture of the malady, does not damage the linen to the same extent, and keeps for an unlimited period.

Veronal: Cases of idiosyncrasy to this drug and toxic effects referable to this hypnotic, as well as its effects on prolonged use (veronal habit) are reported upon by several authors. Wilcox states that in acute poisoning in consequence of an overdose, deep sleep with marked rise of temperature is present, which may end in death in coma with the clinical signs of pneumonia. Frequently slight nephritis and scarlatiniform eruptions occur. In cases of chronic poisoning hallucinations, tremor, ataxia, and disturbances of sight, gait, and speech occur. Treatment of cases of poisoning should be a matter of interest since veronal has been included in the new supply table. Washing out the stomach is claimed to be the only effective method of treatment and should be carried out as early as possible. The use of cardiac stimulants is advised, but infusions of sodium chlorid deprecated because of its imposing an added burden on the circulation; acetic ether and caffein also yielded good results.—(O. G. R.)

EYE, EAR, NOSE, AND THROAT.

E. J. GROW, Surgeon, and G. B. TRIBLE, Passed Assistant Surgeon, United States Navy.

SMITH, A. J., MIDDLETON, W. S., and BARRETT, M. T. The tonsils as a habitat of oral entamebas. Jour. Am. Med. Assn., lxiii, No. 20, November 14, 1914.

Barrett of Philadelphia, Chiavero of Rome, and Bass and Johns of New Orleans have practically invariably found *Entameba buccalis* in pyorrhea pockets, although the Italian dentist has not considered them of etiological significance. Upon pathological examination of 19 cases of tonsils excised on account of chronic tonsillitis in Philadelphia, the same ameba was found in five. Pyorrhea and tonsillar disease have long been associated as predisposing factors with arthritic affections and anemias of obscure origin, and this relation has seemed justified by improvement or cure of the general condition upon effective treatment of the local infection. The same ameba has more recently been found in a series of the above general affections and emetin hydrochlorid, which is now found so valuable in the treatment of Riggs's disease, has been encouragingly successful in curing them. The authors venture the opinion that the conditions are not due to action of amebic toxins but rather to the poisonous substances derived from the disintegration of oral bacteria upon which the amebas feed. Other articles and editorials on the emetin cure of pyorrhea may be found in Dental Cosmos, August and December, 1914, and January, 1915, and in American Journal of Clinical Medicine, November, 1914, the importance of which to preventive medicine in the military services is obvious.—(C. N. FISKE.)

VAIL, D. T. **Enucleation of the eye under local anesthesia.** Jour. Ophth. and Otolaryngol., August, 1911.

He cites from enucleations which he has performed under cocain-adrenalin anesthesia. Fifteen drops of a 1 per cent solution of cocain in 1 to 4,000 adrenalin were used. One-half of this amount was used to anesthetize the anterior segment of the eyeball by subconjunctival injections in three or four places. The other half was injected behind the eyeball in the region of the optic nerve after the recti muscles were all severed and before the nerve was divided. An interval of about 15 minutes was allowed to elapse between the two injections.—(E. J. G.).

SEIDEL, E. **On a modification of Siegrist's method of local anesthesia in enucleation of the eyeball.** Klin. Monatsbl. f. Augenh., ii, 49.

1. Anesthetizing the conjunctival sac by five instillations of a 10 per cent solution of cocain at intervals of one minute.

2. From 1 to 2 c. c. of 1 per cent novocain in physiological salt solution, with 5 drops of adrenalin (1 to 1,000), are injected about 4 m. m. from the limbus, beneath the conjunctiva so that it bulges like a vesicle. Then the closed lids are massaged for about two minutes in order to distribute the injected fluid into the surroundings.

3. A straight canula needle, 5 cm. long, is introduced over the insertions of the muscles, and under constant pressure, 2 c. c. at each place are injected toward the middle point of a line between the optic foramen and the point of entrance of the optic nerve into the eyeball. Half of the contents of the syringe is spent during the advancement of the needle, the other half is injected retrobulbarly. This is followed by considerable exophthalmos and edema of the lids. After 20 minutes the enucleation is performed without the least sensation. Complete anesthesia often lasts for 50 minutes.—(E. J. G.)

KAHN, H. and GORDON L. E. **The use of pituitary extract as a coagulant in the surgery of the nose and throat.** Jour. Am. Med. Assn., lxiv, No. 4.

Calcium salts, blood serum, and epinephrin are the agents usually employed to check hemorrhage. Following the report by Citelli to the Seventeenth International Medical Congress in London, August, 1913, on the use of pituitary extract for the control of hemorrhage, the authors have used the drug on about one hundred patients with no untoward results.

Technic. Pituitary extract was administered hypodermically with a dosage of 12 minims for children and 15 minims for adults, not less than 15 minutes before the anesthetic.

It was found that coagulation time was materially reduced. Hemorrhage following nose and throat operations was very much reduced, especially operations on the turbinals.

The effect on the blood pressure in children was variable, systolic pressure was raised in 55.31 per cent; reduced in 36 per cent.—(G. B. T.)

IGLAUER, S. Value of roentgenography in diagnosis of diseases of the larynx and trachea. Jour. Am. Med. Assn., lxiii, No. 21.

Technic.—Patient in sitting or lying posture, with plate 8 by 10 inches in contact with side of neck and parallel with the median plane of the body. The exposure lasts six seconds, patient being instructed not to swallow. A profile view, with one side of the larynx superimposed upon the other, is obtained. The side in contact with the plate comes out very clearly.

Diagnosis.—A tuberculous larynx shows up hazily as though overdeveloped, showing a rarefaction of the deeper structures, while syphilis (tertiary) usually shows an overgrowth.

In laryngeal stenoses the narrowed lumen is shown quite clearly, while in case of tumors or foreign bodies great aid can be derived from a good roentgenogram—(G. B. T.)

KELLY, A. B. The difficulties and dangers of exploratory puncture of the antrum of Highmore. Brit. Med. Jour., No. 2815.

The usual site of puncture was through the outer nasal wall under the inferior turbinate.

Polypi, if present, should be removed and cocain and adrenalin used to reduce swelling of the mucosa. Dangers pointed out are transient hemiplegia, abscess of the cheek, disturbance of vision, and even fatal syncope.

Untoward symptoms are much more likely to occur if forcible perfusion is performed rather than simple washing out of the antrum.—(G. B. T.)

MUECKE, F. F. Auditory reeducation. Brit. Med. Jour., No. 2815.

Out of a series of 36 cases, 1 was cured, 3 were definitely improved, 10 were improved but relapsed, while 22 were unchanged.

Two types of machines were tested. The objectives aimed at were: The production of sound vibration from 80 to 3,500 per second, (2) control of the intensity of the sound wave, (3) regulation of the waves to each ear separately, (4) vibration of the drum by

the sound wave. Treatments lasted from 3 to 5 minutes, and if no improvement resulted after 14 treatments they were discontinued.

The only cure was a case of neurasthenic deafness. The improvements noted were no more than would be expected from treatment by the Eustachian catheter or pneumo-massage.—(G. B. T.)

REPORTS.

NOTES ON MARINE RECRUITING.¹

By F. H. BROOKS, Passed Assistant Surgeon, United States Navy.

The method adopted by the Marine Corps for the purpose of recruiting that branch of the service is radically different from that in use in the Navy and more nearly approximates that employed by the Army. For recruiting purposes the United States are divided into three districts, viz, eastern, central, and western. Two recruit depots have been established to which all accepted applicants are sent. One of the depots is at Norfolk, Va., and the other is at Mare Island Navy Yard, Cal. All applicants from the eastern and central divisions, with the exception of the Minnesota district of the latter division, are forwarded to the recruit depot at Norfolk. These applicants are examined by either civilian doctors or medical officers of the Navy at the recruiting stations and, if accepted by them, are sent to the depot for final acceptance and swearing in. There is one exception to this rule, and that occurs when the applicant has had previous service in the Army, Navy, or Marine Corps, in which case his enlistment is completed at the recruiting station and he is then sent to the recruit depot.

It may not be wholly without interest to briefly outline the routine that an applicant follows while at the receiving camp prior to his enlistment and transfer to the recruit camp. Immediately upon his arrival he is required to take a bath, a bunk is assigned him, and his clothing is sent to the fumigator and there thoroughly sterilized. He is given a suit of pajamas to wear until his clothing is returned to him. Each applicant is required to take a bath daily before 8 a. m., and after making up his bunk and tidying up his sleeping quarters, he is permitted to pass the remainder of the day indulging in such recreations as his inclinations may dictate. He is furnished chewing and smoking tobaccos free of charge; card games, magazines, and a phonograph aid in amusing him. He is taken to the moving pictures and boxing matches three evenings a week. He is shown all phases of a marine's life ashore and is allowed to see drills, baseball games, the scrubbing of clothes, and is fully informed as to the character of the duties and work he will be required to perform after he enters the service. On the second or third day after his arrival he is given

¹ From Annual Sanitary Report, Marine Barracks, Navy Yard, Norfolk, Va., January 1, 1915.

a physical examination and dynamometer tests. If he successfully pass these, he is, on the next day, sworn in, fitted out with uniforms, and assigned to a drill company for instruction. The advantages of this method may be briefly summarized as follows:

(a) The applicant receives first hand information as to what sort of life he may expect to lead before he enlists.

(b) He receives, perhaps, his first idea of military discipline. The glamor of a soldier's life that imagination and the very interesting recruiting books may have engendered has, in large part, been dispelled before he is enlisted. He enters the service with few or no delusions.

(c) The applicant after observing the character of the work and duty he will have to perform may decide that he does not believe himself fitted for the service or that he may not like to enter the Marine Corps. He is allowed to decline to enlist. During the year only 14 out of 2,340 applicants refused to enlist.

(d) If upon examination by the medical officer he is found physically or mentally unfit for the service he is summarily rejected. There is no delay awaiting the approval of a medical survey and there are no accounts to be closed.

(e) There result, it is believed, fewer dissatisfied recruits and a much less number of absentees and possible deserters.

RECRUITING STATISTICS.—During the year the recruiting stations sent 2,466 applicants to the Norfolk depot; 1,526 were received from the eastern district and 940 from the western district. The following table shows their disposition:

Number of applicants.....	2,466
Eloped en route.....	126
Declined to enlist.....	14
Rejected by commanding officer.....	88
Rejected by medical officer.....	327
Enlisted.....	1,911
Total.....	2,466

In the table below are shown the rejections for physical defects, by quarters:

Quarters.....	First.	Second.	Third.	Fourth.	Total.
Total number rejected.....	138	80	61	48	327
Feet:					
Flat.....	30	9	6	3	48
Splay.....	10		2		12
Other defects.....	8	4	2	2	16
Hernia:					
Umbilical.....	6	4	1	3	14
Inguinal and relaxed rings.....	6	12	6	5	29
Venereal disease:					
Gonorrhea.....	8	2	2	7	19
Chancroids.....			1	1	2
Syphilis.....		1	1		2
Tonsillitis and enlarged tonsils.....	6	3	1	1	11

Quarters	First.	Second.	Third.	Fourth.	Total.
Defective vision.....	7	4	1	.....	12
Defective teeth.....	3	1	5	2	11
Ear:					
Defective hearing.....	1	3	.....	1	5
Otitis media.....	6	.....	.....	.....	6
Deficient chest expansion.....	4	4	2	.....	10
Undescended testicle.....	2	.....	1	.....	3
Diseases of the heart.....	12	9	18	16	55
Total.....	109	56	49	41	255
Other causes.....	29	24	12	7	72
	138	80	61	48	327

The number of rejections for all causes equalled 14 per cent of all applicants examined. The largest number of rejections occurred during the first quarter of the year. It was during the months of this quarter that we received the largest number of undesirable applicants, and this is probably the experience of those in charge of recruiting for the Army and Navy. Cold weather causes men who are out of employment to enter some branch of the public service and, all things being equal, the largest number of applicants present themselves during cold weather. The situation in and the sending of marines to Mexico stimulated recruiting to an unprecedented degree, and during the third quarter we received 732 applicants. Doubtless the business depression throughout the country was an important factor in producing this marked increase and continued to operate through the fourth quarter, during which period we received 642 applicants. These figures do not include those who eloped en route.

During the year more rejections were made for defective feet than for any other one cause. Out of a total of 76 for the year 48 were rejected during the first quarter. Of these, 30 had flat feet, 10 had splay feet, and 8 had other defects, such as hammer toes, overriding toes, corns, and bunions. The question of splay feet was brought to my attention soon after reporting for duty at this post, as it became necessary to survey and discharge a man with this trouble. The widest shoe issued to recruits is 4 inches, and the feet of many of the applicants rejected were, by actual measurements, found to be $4\frac{1}{2}$ inches wide. I conducted some experiments last March to determine what effect the carrying of weight had upon a man's foot. The equipment of a marine in heavy marching order weighs 73 pounds. Measurements of the feet when a man is stripped and when dressed and equipped in heavy marching order show that his feet have spread one-fourth of an inch under the weight of his equipment. I believe it is clear that it would be pure folly to crowd a $4\frac{1}{2}$ or $4\frac{3}{4}$ -inch or even a wider foot into a 4-inch shoe and expect the owner of that foot to drill and march with comfort. On March 7th I prepared 33 footprints of an applicant who had splay feet and forwarded them

to the recruiting stations in order to acquaint the recruiting and medical officers at these stations of some of the difficulties we experienced here in getting their applicants properly shod. As a result of this and of some correspondence in April, the number of rejections for this trouble decreased to two for the next three quarters. Also the question of flat feet was given more attention at the recruiting stations, and the number of rejections for this defect was very materially reduced.

The next most frequent cause for rejection was heart disease. That an applicant is rejected for heart disease does not imply that his heart is permanently injured nor is there time available to permit the determination of the degree of impairment. All applicants in whom a heart murmur is detected are held for two days, and in some cases for three days, for observation. If the murmur persists for this period and is transmitted to the left axilla, the applicant is rejected. It is believed that the exercises and drills a recruit is required to perform while undergoing instruction here would seriously, if not permanently, injure a heart that had a slight defect in muscular structure or valvular function.

Hernia was the next most frequent cause for rejection and under this heading are included those rejected for relaxed rings. There were 14 rejections for umbilical hernia. While there was not in any of the cases I saw an actual umbilical hernia present, there was a patency of the umbilical opening that impaired the integrity of the abdominal wall and rendered the development of a hernia in this region not only possible but highly probable. Those rejected for inguinal hernia and relaxed rings totaled 29 for the year. Those rejected for relaxed rings were able to show a tumor 1 inch in diameter upon coughing. This tumor passed through the internal ring and entered the inguinal canal and a decided impulse was noticeable, but the tumor was easily reducible. The size of the tumor meriting rejection was arbitrarily fixed at 1 inch in diameter. This was considered a very liberal allowance and is one, I fear, that will have to be reduced. An instance may be cited in the case of E—, who was received here from Cleveland, Ohio, and enlisted on April 27. He had a relaxed ring, but the tumor that developed on coughing did not appear to be 1 inch in diameter. On April 29, two days later, he developed an incomplete indirect inguinal hernia and was admitted to the sick list and transferred to the naval hospital for operation. Another instance occurred in a recruit who developed a hernia as the result of the strain and muscular exertion incident to wall scaling. Several other instances in which recruits developed hernias who were enlisted with relaxed rings might be cited, but I believe that these two cases demonstrate the desirability of rejecting applicants with relaxed rings.

SUBNORMAL TEMPERATURES IN RECRUITS.

The winter and spring months of the last calendar year were very severe and we had long periods of rain, snow, sleet, and slush to contend with in attempting to instruct and drill the recruits. Beginning about the middle of February and continuing during the unusually inclement weather many recruits appeared at sick call with subnormal temperatures ranging from 95° F. to 98° F. and with no other signs of disease, but with subjective symptoms of malaise. These men almost invariably stated that their appetites were good, but that they felt "all in." In many instances, recruits would appear with severe infection and inflammation of the tonsils and throats and in whom you would naturally expect a temperature above normal, but their temperatures were found to be normal or subnormal. During these periods of severe weather we had many cases of measles, mumps, and chicken pox. This condition of subnormal temperature was a new and unusual one in my experience and an investigation was begun to determine its cause. Unfortunately the investigation was ended before its completion by the release of recruits for duty in Mexico. With the advent of balmy weather in the spring, tonsillar affections, subnormal temperatures, and exanthematous diseases disappeared. Such investigations as I was able to make disclosed the fact that all recruits, upon being issued shoes, are required to put them on and then stand in water until the shoes are saturated. The shoes are worn until dry and it is hoped by this procedure to mold the shoes to the contour of the feet. While this practice for conforming the shoes to the feet has the approval of no less an authority than Maj. Munson, of the Medical Corps of the Army, it is my belief that its use in extremely cold weather and where the recruits have to live in tents, as they do here, was largely responsible for the great number of tonsillar and throat affections we had. The prime cause of the subnormal temperatures was, I believe, the radical change in the mode of living of the recruits. Numbers of these recruits were unused to taking systematic exercise; many of them had been clerks or stenographers and nearly all of them had been living a more or less sedentary life. They had also been living under conditions that afforded them better protection from the cold and dampness at night than it was possible to secure for them while living in tents. To spend day after day drilling, marching, double-timing, and performing Swedish movements was so marked a change from their former life as to seriously disturb the metabolic equilibrium. The anabolic mechanism was not equal to this sudden and severe demand. The body, in an endeavor to meet the new conditions, called upon and used up all the reserve strength and, as a natural result, the temperature dropped to and remained at a subnormal

point. It was noticeable that recruits who had been seasoned by a few weeks' drilling and whose metabolic mechanism had become adjusted to the new conditions did not develop subnormal temperatures. By excusing the recruits with subnormal temperatures from all drills for a few days it was noticed that their temperatures returned to normal and rarely fell below that point after being returned to full duty. This may have a bearing on the development of tonsillar affections and exanthematous diseases. There is certainly no question that these recruits' resistive powers were markedly lowered during these periods of low temperature. In this connection it is pertinent to cite the cases of two recruits who were enlisted on October 15 and 16, 1913, respectively, and who were discharged from the service on March 1, 1914, with pulmonary tuberculosis, not in line of duty, the tendency to which disease, if not the actual infection, existed prior to enlistment. It is not, I believe, too much to infer that the fatigue incident to the drills and exercises they performed while in the recruit camp may have lowered their normal resistance to a degree that permitted a latent infection to develop into an active disease. It is believed that the use of water in conforming the shoes to the feet should be discontinued and oil substituted for it. The objection to the use of oil is that the men are then unable to shine their shoes. This objection has small weight when the question of impairing the health of the men by using water is considered. It is also believed that recruits should be more gradually introduced to drills. No football team begins its first practice by indulging in a 20 or 30 minute period of scrimmages nor does an athlete in training for a marathon begin by running the entire marathon distance the first day. On the contrary, a football team begins with light practice and a marathon runner begins his training by running short distances. The amount of work is gradually increased daily and the athlete gradually becomes hardened and reaches his maximum of fitness by gradations. In like manner should the recruits at the depot be trained, especially so during the winter months, and I believe we would have no more cases of subnormal temperatures.

NOTES ON RECRUITING.¹

By J. B. BOSRICK, Assistant Surgeon, Medical Reserve Corps, United States Navy.

Medical attention to men on the more distant substations has been given by local practitioners. Those nearer the main station have been ordered there for treatment, or the hospital apprentice, first class, sent to the substation with general instructions and authority to exercise his discretion, reporting by letter or telegraph daily.

¹ From Annual Sanitary Report, Dallas, Tex., Jan. 1, 1915.

The nine substations are in charge of men of various ratings who have had preliminary instruction in making physical examinations at the main station. They are held to account for any applicants sent to the main station at Government expense who do not fulfill the physical requirements as laid down in the folder furnished them as a guide. As to mentality and temperament, each man is instructed to select only such applicants as he would like to have as a shipmate in his division or part of the ship at sea.

On the main station the Binet-Simon test for the feeble-minded has been used as often as the need for it has been felt, but the findings have usually been indefinite, and a disposition to ignore them was felt as often as to abide by them. The test takes more time than can usually be given it. If a doubt as to mentality exists after the play of questions regarding family history, education, and former occupations and diseases and after a discussion of the topics that these questions lead to, that doubt, for practical purposes, should be considered a cause for rejection of the candidate.

Forty men were examined for the Hospital Corps, 25 of whom were found qualified, and 21 of these were enlisted. Many fail in general education, some of whom enlist as apprentice seamen, expecting to remedy the defect after entry into the service. A working knowledge of fractions and percentage, a legible hand, and a fair ability to spell are rigorously demanded. One fulfilling these requirements is seldom found deficient in geography and history, in which subjects more latitude is allowed to otherwise desirable men. To obtain the most desirable men for the Hospital Corps, it is suggested that medical officers at training stations, after more extended observation than is possible at a recruiting station, be instructed to induce suitable men in the companies to apply for change of rating.

ECONOMY IN USE OF HOSPITAL SUPPLIES.¹

By A. R. WENTWORTH, Medical Director, United States Navy.

During the last few years the necessity for more care and economy in the administration of hospitals has become apparent. * * * We believe that we have covered the points at which leakages may be expected to occur, i. e., commissary stores, dispensary, linen room, supply room, etc.

Commissary stores: In addition to the regular commissary ledger required, we have installed a permanent and daily inventory in the shape of a card system. We are thus enabled by looking at the cards to tell at once the exact amount of each article received and expended. The keys for the commissary storeroom are in the hands

¹ From Annual Sanitary Report, United States Naval Hospital, Puget Sound, Wash.

of the commissary steward and pharmacist and no others. A weekly menu is made out and visé by the executive officer, and every endeavor is made to keep the ration as low as possible. But with the increasing cost of foodstuffs it is expected that the daily cost of ration for this year will be slightly more than that of last year.

Dispensary: A permanent and daily inventory is also kept in the dispensary and a monthly checking by actual count is further required. Slips for issuing of material, such as gauze, cotton, liquor, alcohol, etc., and of all nonexpendable articles must be visé by the executive officer before being issued. The liquor and alcohol slips are made in duplicate, one copy being kept by the executive officer and the other being filed in the dispensary. At stated intervals these are compared and the amounts issued should correspond to the amounts removed from the locked storerooms. In practice this has proved very effectual, and it was a question whether our usual semiannual requisition was necessary. For instance, we have found that for all purposes, including surgical work and dressings, we have used but an average of 50 rolls of gauze per month for the six months past, and this without slighting any case.

Supply room: The same general card system obtains in the issuing room for cleaning material, i. e., brooms, brushes, soap, powder, wax, floor polish, etc. This material is, except in emergency, issued weekly after approval by the executive officer. In addition to this, an account is kept separately of what each ward uses, and competition and saving are thus encouraged.

On the 1st of January of each year an inventory of all property has been taken similar to that required at the end of the fiscal year, and we find this to be a great help in keeping track of nonexpendable property.

Scrupulous care to avoid excessive use of heat, light, and water throughout the building has been observed. In this connection there seem to be many more lights than are necessary, but those not required have not been used.

Linen: Clean linen is issued once a week from the linen room except in emergency. Slips for the linen required are made out by the ward nurse, checked up and signed by the executive officer, and issued only after such visé. A card system is kept charging each ward with the amount on hand, amount used, and amount returned when soiled. Their counts must check up. Soiled linen is turned in daily before 8.30 a. m. to the hospital steward in charge of linen. It is then sterilized and placed in a large locker for soiled linen, to which this hospital steward alone has the key. In addition to this, the hospital steward checks up and counts the linen in the wards once a week.

VENEREAL PROPHYLAXIS.—EXAMINATION OF CIVIL EMPLOYEES.¹

By C. N. FISKE, Surgeon, United States Navy.

The usual number of venereal infections (chancroid, 8; gonorrhea, 45; syphilis, 19) probably constitute about the minimum to be expected from abundant local facilities for exposure and length of time frequently ensuing between exposure in San Francisco and the prophylactic treatment at marine barracks or yard dispensary the following morning; at the end of the coming year it will be most interesting to note any change in ratio or character of infections which may follow in 1915 the abolition of segregated districts throughout California in January, 1915, and the promised rigid enforcement of laws suppressing lodging houses misused for prostitution.

Numerous cases of bitumen paint and cement poisoning have occurred among the workmen in confined spaces, in spite of efforts to keep fresh air circulating; the symptoms noted closely conform to those from exposure to the fumes of turpentine substitute, although in one selected case the urine gave a positive test for phenol.

The physical examination of civilian applicants for employment in the yard practically occupies the time of one medical officer every afternoon; 2,223 such examinations were made during 1914. Some of these examinations were duplicates, owing to applicants seeking more than one position, while probably an equivalent number of reexaminations were made for several causes.

It not infrequently is found that a workman has marked physical disabilities decidedly apparent which have not been noted by civilian examiners on very recent examination reports (Form 1800) for the classified service. If naval medical officers are to examine the majority of applicants gratis it would seem that the Government should consistently require that all applicants be examined by a Government physician having its interests at heart; undue hardship upon non-residents of the navy yard vicinity would be obviated by authorizing physicians in every branch of the National Government to conduct the examinations, as they are to be found in most large cities and every State; the data required are sufficiently obvious on Form 1800. I recommend that physical examinations before some Government physician be required for the classified service, as has already been made mandatory for laborers.

INDUSTRIAL NOTES FROM BOSTON YARD.²

By N. J. BLACKWOOD, Medical Inspector, United States Navy.

The publication of a sanitary bulletin by the medical officer of the yard has been established, with the commandant's approval, to be issued from time to time and to contain current information on

¹ From Annual Sanitary Report, Mare Island Navy Yard, Jan. 1, 1915.

² From Annual Sanitary Report, January 1, 1915.

sanitary and hygienic matters which will be of use to the medical officers of visiting ships, and at the same time exercise a certain control over the purveyors of food and milk to those living in the yard, as well as the messes on the ships. An attempt will also be made in this publication to stimulate the education of the civil employees in the matter of personal hygiene and safety-first methods, with the idea of decreasing the number of accidents and so lessening the amount heretofore found necessary for the government to pay out in compensation claims.

Inasmuch as lead poisoning has been classed among the injuries for which compensation must be paid by the government, and in view of the fact that nearly all workers in lead suffer from this condition at one time or another in the course of their occupation, it was deemed advisable and no more than right that the government should be protected to the extent of knowing whether a man was or was not suffering from this condition before he was employed in the yard. Upon the suggestion of the medical officer of the yard, the commandant therefore ordered that all lead workers now employed and all applicants for work in the future, should be examined for chronic lead poisoning. This is now being carried out and examinations are now made of urine, blood, gums, reflexes, and any other parts which may indicate the presence of lead in the system. Besides this an attempt is being made to educate the men in the best methods of protecting themselves against lead poisoning, by distributing among them printed slips giving precautionary measures to be observed and laying great stress on the subject of personal cleanliness. To assist in this latter measure, realizing the restrictions in bathing facilities in the homes of many of the laboring classes, shower baths are to be installed in the central paint shop, and all workmen will be encouraged to use them. One great obstacle to thorough cleanliness at this season of the year is the half-hour noon period. This time is so short that painters have scarcely time to leave their work and properly wash their hands before eating their noonday meal, and therefore they are more prone to the poisoning than if they had more time.

NOTES ON TROPICAL HYGIENE.¹

By A. STUART, Surgeon, United States Navy.

The health of the crew during the time the ship was at anchor in Haitien waters, outside of the admissions for venereal disease was excellent. On account of the long absence from the States dietary conditions were necessarily affected, especially with regard to the lack of variety and sufficiency of supplies. This condition

¹ From Annual Sanitary Report, U. S. S. *South Carolina*, Jan. 1, 1915.

was remedied to some extent by the abundance of grape fruit and alligator pears, which were brought on board and for which the men seemed to have a special craving. The eating of fruit probably benefited the crew greatly. The oranges were poor, and bananas were rather scarce.

While ships are doing police duty in the Tropics it is recommended that all drills be held between the hours of 6 a. m. and 10.30 a. m. In the heat of the day between 12 noon and 3.30 p. m. the men should rest as much as possible. Special attention should be given to dietetics in the Tropics. Morning coffee, with rolls, at 5.30 a. m., regular breakfast at 11 a. m. (after drills), and a light meal served at 4 p. m. should be sufficient. Rest and recreation from 4.30 p. m. to 6 p. m.

During the stay of the U. S. S. *South Carolina* in Haitian waters nothing was more forcibly brought to my attention than the folly of not protecting the heads of officers and men by solar helmets. Our colleagues of the British and French services, with whom we were associated in front of Port au Prince, were provided with solar helmets, and all of their enlisted men, when on duty in boats not provided with awnings, also had helmets on. For military reasons our personnel can not at all times be kept under canvas while serving in the Tropics, and often they are "grilled" by sunlight at a temperature of 117° F. The solar helmet worn by our officers some years ago did not accomplish the purpose for which it was intended by reason of serious defects in design. The brim was not wide enough, and many officers said that it obstructed vision. It is a well-recognized fact that the danger time for direct light rays in the Tropics is between forenoon and afternoon. A helmet that would be light, with a brim almost flat so as not to obscure vision, wide in front and on both sides would serve as an efficient protection against the light rays during the heated portion of the day. The British officers in Mexican waters last winter used a helmet of a new pattern, somewhat similar to the one here suggested, and apparently it came up to all the requirements of tropical service. It protected the face and nape of neck, and vision was not obstructed.

BATTLESHIP VENTILATION.—USE OF BARRACKS DURING OVERHAUL PERIOD.¹

By T. W. RICHARDS, Surgeon, United States Navy.

Ventilation: Speaking in general terms, the combined heating and ventilating system furnishes a sufficient amount of air and rather more than enough heat except in extremely cold weather. Unfor-

¹ From Annual Sanitary Report of the U. S. S. *Florida*, January 1, 1915.

unately, however, neither heat nor air can be properly regulated and distributed. Those compartments about the ship which require a particularly abundant air supply are not necessarily the ones which require the most heat; in fact, the contrary is frequently the case. On the other hand, certain living spaces which are exposed to the influx of cold air from outside, such as most of the gun deck compartments which have hatches or gun ports more or less open at all times, require relatively more heat and less air. The fact that this air-heat ratio is not the same in all parts of the ship or even in all parts supplied by single "units" is an inherent defect in the system which could only be overcome by considerably increasing the number of blowers and thermotanks—in other words, having small "local" units—but this would doubtless add greatly to the difficulties of installation and operation. The desiccating effect of the air as actually supplied has been frequently criticised and is much to be condemned. An experimental "humidifier" has been installed on one unit, but it has never operated. It was completely overhauled and tried out in December, but it is so far a complete failure.

Another objectionable feature is due to the location of outlets overhead. The heated air should be admitted at some point about midway between decks. From careful observation of the whole system, as installed on this ship, I am strongly of the opinion that a far more satisfactory arrangement would be to have the air from the blowers slightly warmed, i. e., just enough to take the chill off in very cold weather, steam coils being utilized as required to bring the various living spaces up to a habitable temperature.

The brig is particularly deficient in air supply, and I consider additional provision in this respect an urgent necessity. At times men have had to be temporarily released from confinement, and upon at least two occasions individuals have been carried to the sick bay. In very hot weather the medical officer will be reluctant in signing a statement to the effect that 30 days' confinement under prevailing conditions would not seriously impair the health of a prisoner. Two canvas ducts have been installed as a temporary measure, one from a blower and the other from a portable blower outside the compartment.

Barracks for use during the overhaul period: The admirable practice of assigning the ships to a "home yard" for a general overhaul at annual intervals has had so many good results that I hesitate to make any criticism. Nevertheless I think that from a sanitary standpoint this will frequently prove the most unsatisfactory quarter of the year, particularly if the period happens to occur during cold weather. In the first place the ship can not be kept as clean as usual, and this has been well exemplified aboard this vessel during

the past quarter. Special orders on this subject were issued by the commanding officer upon arrival at the yard. They were faithfully carried out by officers and men generally, and I am sure that the results were as good as it is possible to attain under the circumstances, but with the large force of workmen constantly on board littering the ship with the débris inevitably accompanying their occupation, ideal conditions were impossible. The work itself necessarily interferes with the habitability of the living quarters and the welfare of their occupants; hatches and ports are kept open, leading to draughts and exposure, systematic drills and exercise for the crew are quite impossible, and even so simple a sanitary measure as airing bedding frequently becomes impracticable. Such conditions I consider chiefly responsible for our outbreak of tonsillitis; cases became more and more frequent with the advent of cold weather and our continuance at the yard, and the disease was most prevalent by the end of the third month. Some such occurrence had been anticipated and such measures as boiling all hand and deck swabs at least once daily, cleansing spitkicks scrupulously (they are kept half filled with phenol solution), punitive measures for all who offend sanitary regulations, and daily sterilization (by boiling) of the scuttle-butt mouthpieces, were rigidly enforced. Yet the physical condition of the ship's company, as a whole, is decidedly lower than it was three months ago and in many respects not so good as when the ship left Vera Cruz after a long stay in the Tropics. The ideal remedy for such conditions has been often pointed out by medical officers, and I cordially concur in the view that barracks ashore should be provided for the crews of vessels undergoing "overhaul." From a sanitary standpoint there is everything in favor of such an arrangement, and I have no reason to believe that it would be objectionable on military grounds, but quite the contrary. If so, the question becomes one of economy rather than expediency, and I believe results would amply justify the expenditure.

**SANITARY NOTES FROM THE U. S. S. OZARK.—MALARIAL PROPHELY-
LAXIS.¹**

By R. W. McDOWELL, Passed Assistant Surgeon, United States Navy.

The *Ozark* was at anchor in the Panuco River off the city of Tampico from May 25 until December 20, when she sailed for Key West. Tampico is about 6 miles from the sea, on the northern bank of the river. On all sides are marshes and lagoons, the breeding places of countless numbers of mosquitoes. These were blown aboard in large numbers, and it was almost impossible to stay on deck after dark.

¹ From Annual Sanitary Report, Jan. 1, 1915.

The ship was screened and precautions taken against mosquitoes. The screening was of great value in protecting the crew against the enormous swarms of mosquitoes, but it was impossible to prevent some of them from getting inside the ship, in spite of daily inspection and immediate repairs of damaged screens. Every man except those on watch on deck was required to be behind screens after dark, and in addition each man slept under a mosquito netting rigged over his hammock. Those men whose duties required them to be on watch on deck anointed themselves with oil of citronella. Head nets made of thin, small-mesh mosquito netting on wire frames, as a protection to the face and neck, also gloves, were worn, but they were so uncomfortable in the intense heat that their use was discontinued and the men instructed to use frequent applications of citronella and to keep moving.

The entire crew was given a lecture on tropical hygiene, with special reference to preventive measures against diseases present in Tampico at that time—malaria, smallpox, typhoid fever, and dysentery. No communication except that which was absolutely necessary was had with the shore, all on board were vaccinated against smallpox, and four who had not previously received the antityphoid-inoculation were given it. All food was carefully inspected before being brought aboard.

The daily administration of a 5-grain capsule of sulphate of quinin to every officer and man on board was begun and continued during our stay in Tampico. While this did not actually prevent some of the crew from becoming infected with malaria, it had the very desirable effect of preventing an epidemic of malaria soon after our arrival; it kept the men ready for any military emergency, such as landing force (which daily seemed imminent during the first two months); and delayed the actual outbreak of malaria until an apparent military crisis had passed and we were almost ready to come home.

During the first two weeks in July no quinin was given because the supply was exhausted, and it was during this period and the 10 days immediately thereafter that the first real outbreak occurred. Ten cases were admitted during the week of July 5–11, two cases July 12–18, and one case during the next week. The daily dose of quinin was resumed on July 14, and no malaria occurred on board until October, when seven cases were admitted during the month.

During the second week in November the daily dose of quinin was again discontinued, and almost immediately cases began to appear, 24 during the month of November, and 22 during December. The quinin was taken from November 16 to December 20.

During the months of July, August, and September there were 12 admissions, one readmission, and 53 sick days with malaria. During October, November, and December there were 47 admissions, 6

readmissions, and 189 sick days with malaria. The average number of sick days for each case was 3.7 days. The treatment consisted in the deep intramuscular injection of from 1 to 2 grams of the dihydrochlorid of quinin in sterile solution as soon as the diagnosis was made, repeating the dose the following day. A third injection was given if the temperature was above normal on the third day. Rest in bed, liquid diet, hydrotherapy and symptomatic treatment as indicated were also employed. After being returned to duty the patient was given arsenic and quinin by mouth three times a day for 10 days. Only seven relapses occurred, and in four of these the after treatment was not kept up for 10 days. There was but one abscess resulting from the hypodermic administration of quinin, and that was apparently caused by not injecting it deeply into the muscles, but subcutaneously.

Of the 66 cases, there were 59 tertian and 7 of the estivo-autumnal type. The parasites were found in about 80 per cent of the cases, occasionally two or three specimens being required before the parasites could be discovered. Screening the ship, covering the men with mosquito bar while sleeping, the wearing of head nets, and protecting the hands with citronella, tar grease, or gloves while on watch are ideal means of protection against mosquitoes, but the factor of error is so large that the administration of quinin in some degree helps to fill the gap temporarily. The quinin prophylaxis does not prevent malaria; it puts off the evil days; it delays the outbreak of an epidemic which may embarrass or seriously handicap an expedition in its early stages, and this makes quinin prophylaxis of value from a military point of view. With an average complement of 225 officers and men this ship was at anchor for seven months in a place where mosquitoes were terrible in number and size, where malaria is the rule rather than the exception in both native and foreign inhabitants, and yet there were only 59 admissions and 7 readmissions with 242 sick days caused by malaria, and 46 of these occurred in the last two months alone.

During the months of August and September a marked increase in the number of culex mosquitoes was noticed. Previously the anopheles was mostly seen, and occasionally the stegomyia. Coincidentally with the appearance of large numbers of the culex mosquitoes and shortly thereafter, came an epidemic of dengue in Tampico. On the *Ozark* there were 39 admissions with the disease. Careful blood examinations were made in all cases to exclude malaria. All of the cases on board were of the mild or moderately severe type, but in Tampico the writer saw several cases, the severity of which suggested yellow fever. One case seen in consultation with a local physician had all the text-book symptoms of yellow fever, and died on the

fifth day, but the absence of other cases in Tampico (although there were reports of cases up the country), decided us not to make a positive diagnosis of yellow fever in this case. Several cases of dengue seen in Tampico were so severe as to resemble mild cases of yellow fever.

Sand flies were almost as numerous and troublesome as mosquitoes. Bags of sand were used as a protection around the guns and on the bridge, and in this manner a large number of these troublesome insects were brought aboard. They could easily get through mosquito netting, and as a result some of the officers and men who slept on deck on cots, covered with mosquito netting, were terribly bitten and were forced to sleep below, a distinct hardship in the terrific heat, where the temperature of the staterooms even at night rarely went below 95° F. Sand-fly bites when scratched would bleed, and sores difficult to heal would result.

Pinoleas, or Mexican ticks, burrow under the skin and cause ulceration and abscess formations which were numerous and troublesome to both patient and medical officer. The sores will not heal until the tick is cut out and the wound cauterized.

There has been no smallpox on board this ship, although in May and June there were about 80 cases in Tampico. On several occasions cases in the pustular stage of eruption were seen on the streets and among the Mexican soldiers.

Typhoid fever was present in Tampico during the summer and autumn, as was also bacillary dysentery, but this ship was free of both diseases.

Venereal diseases are exceedingly prevalent in Tampico, but as no liberty was given there have been no new cases on this ship.

Climatic conditions in the Panuco River Valley are unfavorable. From May until November the heat and humidity are terrific and depressing. What little breeze there is comes up about 10 o'clock in the morning and dies down early in the afternoon, leaving the evenings and nights hot and humid with no breeze. Rains are of almost daily occurrence in June and July. August this year was unusually dry, while in September there were heavy rainstorms on about half the days.

SANITARY NOTES FROM THE U. S. S. VIRGINIA.¹

By G. L. ANGENY, Surgeon, United States Navy.

During the first nine months of the year there were 11 cases of appendicitis. The occurrence of this unusually large number can not be satisfactorily explained. All the cases appeared while the ship was in tropical waters. The most plausible explanation would appear

¹ From Annual Sanitary Report, Jan. 1, 1915.

to be faulty diet, but the character and quality of the food differed in no way from that of near-by ships which had few or no cases of this disease. Ten of the cases were of the fulminating type, where operation at the end of 12 to 20 hours showed gangrenous appendices or abscess formation. This in spite of the fact that in practically every instance there were few or no constitutional symptoms, and no increase or only slight increase in the leukocyte count. In one case operation 14 hours after onset of the attack showed a gangrenous, ruptured appendix where the white cell count at the time of operation was only 6,200. In no case did the leukocyte count exceed 14,000. All the cases were operated on, five on the *Virginia*, and the remaining ones on the *Solace*. Two of the cases required operation while the ship was under way in a very rough sea, and the writer the only medical officer on board.

After the ship had been in Mexican waters for several months, cases of ringworm began to appear and in a comparatively short time a large number of the crew were affected with this disease, due chiefly to the men regarding it as a trifling condition and not reporting for treatment. Regular crew inspections and vigorous treatment soon stamped out the disease. At one time there were more than 90 cases under treatment. Only a small number were incapacitated for duty.

While at Vera Cruz in January and February the ship's expeditionary force was kept in constant readiness for landing. The "hospital party" was equipped and repeatedly drilled for service. The *Virginia* was not at Vera Cruz, however, when that place was occupied by our forces on April 21, but sailed from Boston two days later. On the way south the battalion was drilled and fitted out for active service. The lack of a suitable uniform came up, as it has repeatedly in the past when men are to be landed for active service. A fairly satisfactory one was secured by coloring white working clothes with a solution of potassium permanganate, using common salt or sea water for a mordant, and on our arrival at Vera Cruz, the battalion was ready for immediate landing. It was not possible to make the suits a uniform color by this method, but, except for appearance, this is a distinct advantage, as the variegated color makes a body of men less conspicuous. The disadvantages of the method are that perspiration fades the color and the oxidizing action of the permanganate impairs somewhat the strength of the fabric. Later on the men were supplied with marine khaki trousers, khaki shirts, tan shoes, and leggings, with either permanganate dyed hat or campaign hat. This combination makes a very satisfactory uniform as to color, but would probably be too warm for the Tropics, while in cold climates additional outer garments would be required.

THE SCHICK TEST AND THE USE OF DIPHTHERIA ANTITOXIN.

Dr. William H. Park, of the New York City Department of Health, read a paper before the pathological section of the Buffalo Academy of Medicine on November 25, 1914, in which he discussed, among other things, the Schick test. This test is utilized to detect those who are susceptible to diphtheria, and Dr. Park discussed several epidemics in which it had proved its reliability.

The test is applied by injecting intradermically one-tenth of a cubic centimeter of diphtheria toxin containing one-fiftieth of the dose of toxin fatal to a guinea pig. An area of hyperemia developing about the site of the injection in 48 hours indicates a susceptibility to diphtheria, and in the presence of an epidemic warrants the administration of an immunizing dose of antitoxin. No reaction at the site of injection is regarded as proof that diphtheria antitoxin is present in the blood, and indicates that the individual enjoys an immunity, and therefore should not receive an immunizing dose of antitoxin.

Dr. Park stated that his investigations have convinced him that the amount of toxin circulating in the blood in an ordinary case of diphtheria is not large, and could be neutralized by 50 or 60 units of antitoxin, provided the toxin and antitoxin could be brought together intimately. He advocated the use of 1,000 units as an immunizing dose. He asserted that 3,000 units were sufficient for most cases of diphtheria, and only one should be given. Reference was also made to the beneficial effect of intravenous injection of diphtheria antitoxin, especially in unusually severe infection.—(Reported by J. J. A. McMULLIN.)

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TRUMAN H. NEWBERRY,
Acting Secretary.

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PREFACE.

The publication and issue of a quarterly bulletin by the Bureau of Medicine and Surgery contemplates the timely distribution of such information as is deemed of value to the medical officers and the Hospital Corps in the performance of their duties and with the ultimate object that both shall continue to advance in proficiency in respect to all of their responsibilities.

It is proposed that the Naval Medical Bulletin shall embody matters relating to hygiene, tropical and preventive medicine, pathology, laboratory suggestions, chemistry and pharmacy, advanced therapeutics, surgery, medical department organization for battle, and all other matters of more or less professional interest and importance under the conditions peculiar to the service and pertaining to the physical welfare of the naval personnel.

It is believed that the corps as a whole should profit, to the good of the service, out of the experience and observations of the individual. There are many excellent special reports and notes beyond the scope of my annual report being sent in from stations and ships, and by communicating the information they contain (either in their entirety or in part as extracts) throughout the service not only will they be employed to some purpose as merited, but all medical officers will thus be brought into closer professional intercourse and be offered a means to keep abreast of the times.

Reviews of advances in medical sciences of special professional interest to the service, as published in foreign and home journals, will be given particular attention. While certain medical officers will regularly contribute to this work, it is urged that all others cooperate by submitting such abstracts from the literature as they may at any time deem appropriate.

Information received from all sources will be used, and the bureau extends an invitation to medical officers to prepare and forward, with a view to publication, contributions on subjects relating to the profession in any of its allied branches. But it is to be understood that the bureau does not necessarily undertake to indorse all views and opinions expressed in these pages.

W. C. BRAISTED,
Surgeon General, United States Navy.

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SPECIAL ARTICLES.

THE NORMAL HEART IN THE NAVY.

By G. F. FREEMAN, Surgeon, United States Navy.

What is the normal heart from the naval medical officer's point of view? This title is unsatisfactory, but seems to express the purpose of the paper as well as any. Having been interested especially in the study of the heart, notes and statistics have been compiled, primarily to make certain observations and secondarily to see if any system of examination could be found by which the history of the heart could be followed throughout the service. It was also considered that weak hearts should be eliminated at the recruiting office rather than have them drag on in the service to be discharged later by medical survey.

It is found that there are some mistaken ideas in regard to the interpretation of some conditions found in heart examinations, as well as the omission of some details that should be recorded at the time of a physical examination, in order to follow up these cases in their future medical records. I use the term "mistaken idea" advisedly, inasmuch as I have changed the opinions received in earlier years as to the interpretation of signs found in heart examinations in the Navy, and thus refer especially to my own mistakes. On the other hand, I have found that other medical officers have passed through the same errors, and thus a general discussion of the subject would be of benefit. A concrete example of the mistakes would be the importance attached to heart "murmurs," more especially a mitral systolic murmur. This murmur may be heard to-day and be absent to-morrow, and is thus heard by one medical officer and not by another. On the other hand, even if present much of the time, it may be of no importance, as a heart lesion should not be diagnosed from the murmur alone. In the past too much importance has been attached to this, and it is a question whether we have not all decided at some time in our lives that a man had "heart disease" because of a murmur, without any other symptoms.

As a preface to the following paper a routine of examination is suggested, it being believed that the data mentioned should be incorporated in all health records at enlistment. As the recruiting

surgeon is unusually busy at times, this routine is made as simple as possible.

A. Location of heart's apex. Space, distance in centimeters from the mid-sternal line and the distance of the nipple from the same line.

B. Relation of the pulmonic second sound to the aortic second sound—that is, greater or less; and if either is accentuated, to record it as so.

C. Any roughness or murmur and the point of maximum intensity.

If any murmur is present, the heart should be more carefully examined and the distance of the right side of the heart from the mid-sternal line should be determined. Under this same heading should be recorded any abnormality of rate or rhythm. This is suggested as a routine examination, it being understood that any other irregularity or peculiarity should be noted. This examination is simple and definite and would give valuable information in the future history, the personal equation of the examiner being, as far as possible, eliminated.

The apex beat when felt is a definite thing and is the most accurate guide to the size of the heart; in fact, the location of the apex beat is often the most important thing to determine in a heart case. The accentuation of the pulmonic or the aortic second is also a definite observation, being a sound heard. Murmurs when certain are also definite, and the recording of such would at least cause the medical officers examining the case in the future to listen more carefully for the same. The percussion of the right side of the heart is more uncertain, and this boundary will depend much on the individual equation of the examiner. It should be determined by *light percussion*, measured in cm. from the mid-sternal line, a pencil line being drawn from which to measure, the outer boundary also being marked by pencil, and a tape laid flat on the chest to measure between these lines. This distance can be taken at the lower border of the second interspace, as this space is always easily determined.

When the above examination is carried out it gives a definite routine for examination and would also be most useful to follow in all heart cases, it being felt that some definite system should be followed in the Navy. It is conceded that on account of vibration and noise, heart examination is usually unsatisfactory on board ship, but that the simple examination as outlined could be followed. Also by choosing the time, some compartment may be found sufficiently quiet to conduct a more satisfactory examination than usually obtains when work is going on. The steering-engine room can be used for ambulant cases as it is fairly soundproof. The use of a stethoscope of the Bowles pattern or similar design is also a great help on board ship. It is also surprising how much can be heard by the examiner's

ear, by applying it to the chest with the other ear occluded to shut out the usual ship's sounds. A soundproof examining room would be ideal, but this can hardly be expected on board ship.

In order to obtain a certain standard for a normal heart accurate statistics have been taken on 100 recruits and also on 100 reenlistments or men in their second or more enlistment. The statistics were taken in view of the fact that there are very few abnormal heart conditions in the Navy, or at least there are very few found presenting the pathological picture seen in civil hospitals, and the standard for a normal heart would help in determining any pathological condition.

The following data were taken in each case:

1. Name.
2. Rate.
3. The number of enlistment.
4. Age.
5. Location of the apex beat, as inside or outside the nipple line, space, and the distance from the mid-sternal line.
6. If the apex beat was not seen or felt, then its location was determined as accurately as possible by light percussion.
7. Distance of the nipple from the mid-sternal line, in cm.
8. Distance of apex beat in cm. from the nipple.
9. Distance in cm. of the right side of the heart from the mid-sternal line at the lower border of the second interspace, determined by light percussion.
10. Width of the sternum at the second interspace.
11. Weight.
12. Height.
13. Chest circumference just below the nipples.
14. Chest expansion.
15. Pulmonic second sound recorded as greater, equal to, or less than the aortic second.
16. Pulse rate sitting, standing, and after exercise.
17. Observations after exercise and general remarks.

The following are the data of 100 cases of "recruits"—that is, recruits received from recruiting offices for "verification" at the receiving ship at Boston. Among this number there were four heart cases that were discharged from the service by medical survey, but a survey was not requested until a certain diagnosis of heart disease had been corroborated by another medical officer. In this same series were also two cases of inguinal hernia and one of defective vision, making in all 7 per cent of cases surveyed from the service. Some cases were passed which were somewhat doubtful, in the hope that the developing influences of the Navy would build a suitable physique, the condition of these men being noted on the health record.

The data of 100 men for reenlistment, or men in more than one enlistment, are given for convenience to the reader in order to compare the statistics of the two sets of records.

	Recruits.	Reenlistments.
Average age.....	18.4	27.4
Heart's apex inside nipple line.....per cent.	66	69
Heart's apex in nipple line.....do.	10	11
Heart's apex outside nipple line.....do.	24	20
Distance in cm. of nipple from mid-sternal line.....	9.4	10.8
Distance in cm. of the apex from the mid-sternal line ¹	8.93	10.5
Heart's apex not felt, determined by percussion.....per cent.	4	4
Distance of the right side of the heart from the mid-sternal line in cm. at the lower border of second interspace ²	2.4	2.4
Apex in fifth space.....per cent.	85	90
Apex in sixth space.....do.	9	7
Apex in fourth space ³.....do.	6	6
Weight.....	133.5	151.6
Height in inches.....	65.6	68.1
Chest circumference 1 inch below nipple, in inches.....	32.75	34.8
Chest expansion at same point, in inches.....	3.3	3.2
Pulmonic second greater than aortic.....per cent.	47	41
Pulmonic second equal aortic second.....do.	11	16
Pulmonic second less than aortic second.....do.	42	43
Pulse sitting before examination.....	83.9	82.4
Pulse standing before examination.....	90.1	87.1
Pulse standing after examination and 1 minute after exercise of 10 "sweeps" (arms extended above head and sweeping down to touch deck or floor).....	93.3	90.1

¹ In recruits the nipple is 0.47 cm., practically 0.5 cm. external to the apex. In the reenlistments the nipple is 0.41 cm. external to the apex.

² The sternum is, on the average, 3.75 cm. wide at the second interspace, thus is 1.875 cm. to the right of the mid-sternal line. Therefore, on the average the right side of the heart is 0.525 cm. to the right of the right border of the sternum at the lower border of the second interspace.

³ It must be remembered that the area of the heart as determined on the surface of the chest does not correspond to the anatomical measurements of the heart as given in the textbooks of anatomy.

Further notes on the above statistics are as follows:

A. In locating the heart's apex the point farthest out at which it could be felt by placing the index or middle finger flat on the chest was taken, thus accurately locating the outside limit of the heart. In doing this it is best to have the man expire air in lungs first, as this facilitates the palpation. In 4 per cent of cases the heart's apex could not be palpated before examination and exercise and was determined by percussion. This latter method is considered as uncertain, but by comparing the percussion on cases where the apex could be felt, with eyes closed so that sight would not influence the location, and percussing lightly with chest expired and passive, it was found that the apex could be located sufficiently accurately. It was found that an apex beat not felt at first could often be felt as the examination proceeded on account of the increased heart's action and, if not then, it could be felt after exercise. In the series of 200 cases there was only 1 case where the apex beat was not felt at some time during the examination. It is granted of course that the location of the heart's apex after exercise is not the normal location, as this factor often caused the apex to be felt farther out. Still it is a good guide, and given an apex beat in the normal limits after exercise, then it can be assumed that the heart is not enlarged to the

left. On the other hand, given a case where the apex is not felt before exercise and is felt in the sixth space outside the nipple line after exercise, this does not necessarily mean that the heart is enlarged, as the increased heart's action is found to displace the location of the apex beat.

In taking the above data two lines were drawn on the chest with a marking pencil, one vertical at the left nipple line, and a vertical line marking the midsternum, the location of the apex being also marked by a dot, and the right side of the heart by a short vertical line. In estimating the measurements a steel tape was laid on the chest wall and the distances read from the tape while there, and not marked by the fingers and then read; which method has been found to give a slight error. In counting the spaces the ridge at the junction of the manubrium and gladiolus was taken and the second space beginning just below this was the guide from which to count the ribs.

In percussing the right side of the heart light percussion is used, and there is much personal equation in locating this boundary. It had been found that the apex that had been felt and marked could be located accurately by this same light percussion with eyes closed, and the same method was used in locating the right border of the heart. Percussion of the heart's apex is uncertain, especially in disease, and when the apex can not be felt the size of the heart can not be well determined by physical examination. In the practically normal heart of the enlisted man, however, the percussion of the heart's apex and verification by palpating the same, gives an invaluable experience. This is noted inasmuch as it is often impossible to determine the heart's apex in hospitals on account of disease or obesity, and cases will also be met among the enlisted men where on account of the same factors it will be impossible to palpate the apex, and where percussion would be entirely uncertain as far as the location of the apex is concerned. This would seldom happen in the usual naval physical examination.

What is found on the heart examination depends much on the individual and varies with the skill and experience of the examiner, and each examination is influenced by this; therefore the necessity for the simplest examination possible is outlined so that there may not be a great difference in the results of future examinations. The same may be said of the examination of the lungs, and repeated examinations of both the heart and lungs give proficiency to the examiner that can only be acquired by these repeated examinations. There are few hearts but what have something worthy of note regarding their condition, and also probably about 75 or 80 per cent of lungs will have something to note as slightly abnormal. These abnormalities can hardly be said to be of enough importance

to cause any pathological status; still their recognition is important, as they aid in determining a diseased condition when it does occur, and also teach us to eliminate unimportant conditions found in the usual physical examination, which at times may seem unusual and almost on the border line of disease. It is thus apparent how valuable is the examination of the "normal" type as found in the enlisted personnel of the Navy.

B. The comparison of the relative intensity of the pulmonic and the aortic second sounds was recorded in order to determine their relation in normal cases.

In many of the men no difference could be determined in the intensity between these sounds, and these were recorded as being "equal." In none of the cases except those rejected for heart disease was there a marked accentuation of the aortic second or the pulmonic second.

It was often noted in cases where the pulmonic second was greater than the aortic second before exercise or excitement, that after these factors were introduced the aortic second became distinctly louder than the pulmonic second. It was to be expected that in the recruits with the average age of 18 years, there would be a greater per cent than 47 with the pulmonic second more accentuated than the aortic second, and it is considered that the excitement and the increased heart's action produced in part the number in which the aortic second was louder. The comparison of second sounds was taken while patient was standing and before examination and exercise.

In the reenlistments, etc., at the average age of 27 there were 41 per cent of cases having the pulmonic second greater than the aortic second. In noting the pulmonic second as less than the aortic second, 42 per cent in recruits and 43 per cent in reenlistments, no case was found where the accentuation was such as obtains in old age or disease. The difference in sound was more marked in the man of 27 than in the boy of 18; the latter is also usually more excited by the unusual examination.

In looking at these figures it can be seen that in 58 per cent in recruits and 57 per cent in reenlistments, the pulmonic second is greater or equal to the aortic second. It is previously noted that in some cases the aortic second became louder than the previously accentuated pulmonic second on exercise. The reverse is also noted, as in some cases the pulmonic second increased its accentuation on exercise. One such case was especially noted in which there was a very feeble apex impulse and an apparently low pulse pressure. Generally the second sounds would resume their original relation after a period of rest following the exercise. In listening to the second sounds it was more satisfactory to have air expired and the chest passive. It is concluded that exercise and excitement change

somewhat the relation of the second sounds, and that to obtain the true relation both these factors must be absent.

C. MURMURS, IRREGULARITY OF RATE OR RHYTHM, ETC.—The following notes will be confined to the cases examined, the observations being recorded at the time of the examinations, which were conducted at the receiving ship examining room at Boston, where comparative quiet was obtained. This was illustrated by a case found to have a mitral roughness in the morning at the examining room, while at noon, on the U. S. S. *North Carolina*, the roughness could not be detected on account of the noise and vibration on board ship; but immediately at the examining room again the murmur was heard once more. The *North Carolina* was at this time in commission in reserve, and had much less noise and vibration than a ship in full commission. It is apparent that an examination except of the simplest kind on board ship is unsatisfactory unless a sound-proof room or compartment is obtained. As examinations of hearts and lungs are very important, this absence of a suitable place for examinations is felt by all medical officers.

In the 100 cases of recruits 4 per cent were surveyed for heart disease, and these cases are not included in the following notes recorded:

Notes were made in 70 per cent of cases, and with the 4 per cent surveyed would make 74 per cent in which something was recorded as being worthy of note.

The tabulated list, in order of frequency, is as follows, none of these constituting a physical disability sufficient to indicate discharge from the service:

RECRUITS.

	Per cent.
Slight systolic murmur, second and third left interspaces, increased by exercise	12
Slight mitral murmur after exercise	10
Aortic second increased to noticeable degree by exercise	10
Slight systolic murmur or roughness at second and third left interspaces after exercise	9
Apex beat changing, fifth space to sixth space, after exercise	7
Heart slightly enlarged	10
Apex beat changing from inside to the nipple line or outside after exercise	9
Cardio-respiratory murmur, systolic	3
Aortic second increased for age	3
Rough mitral systolic	2
Pulmonic second decreased by exercise	2
"Tic-tac" heart	2
Pulmonic second increased after exercise	1
Murmur, systolic, fourth space, right sternum	1
Murmur, systolic, second and third spaces, right sternum	1

	Per cent.
Murmur, systolic, third space, right sternum.....	1
Murmur, double, slight, second and third, left sternum.....	1
Sharp second sound, apex, on exercise.....	1
Marked epigastric pulsation.....	1
First sound apex prolonged and louder than normal.....	1
Apex (in long chest) 7 cm. below nipple.....	1
Sharp aortic and pulmonic second.....	1
Apex beat, fourth space becoming seventh on exercise.....	1
Tachycardia (124) on excitement.....	1
Mitral first sound prolonged.....	1
Heart slightly irregular after exercise.....	1
Heart irregular.....	1
Mitral second sound sharp.....	1
The surveyed cases were for the following:	
Mitral regurgitation, poor physique.....	1
Mitral regurgitation, mild (for fireman).....	1
Tachycardia, constant rate 124, poor physique, bronchitis.....	1
Mitral regurgitation and probably stenosis.....	1

Two cases of hernia and one of defective vision were also surveyed in this series. Other slight defects in this series are not mentioned, as they are not pertinent to the subject. In some cases more than one note was made on a recruit, and thus there were more notes than the number of recruits on whom notes were made.

Compared to the 70 per cent of notes on the verification physically of the recruits is 59 per cent in the cases of reenlistments or men in the second or third enlistment, etc. In the reenlistments there was one rejection on account of heart disease. The following is the list of notes among the reenlistments in order of frequency:

REENLISTMENTS, ETC.

	Per cent.
Heart slightly enlarged, mostly athletes.....	14
Apex inside the nipple line, becoming in the nipple line or outside after exercise.....	10
Aortic second accentuated, and more so after exercise.....	7
Pulmonic second greater than aortic second, but becoming less after exercise.....	6
Heart slower after exercise, athlete's heart.....	6
Heart distinctly enlarged.....	5
Slight mitral systolic murmur after exercise.....	4
Apex, fifth space changing to sixth after exercise.....	4
Aortic second accentuated.....	4
Apex first sound sharp.....	4
"Tic-tac" heart, sounds equal except after exercise.....	3
Systolic murmur, second left interspace after exercise.....	3
Systolic murmur, second to third right interspace after exercise.....	2
Systolic murmur, second to third space, right and left after exercise.....	2
Systolic murmur, base of heart after exercise.....	2
"Booming" first sound apex.....	2

	Per cent.
Pulmonic second less than aortic second, but becoming greater after exercise	2
Pulmonic second "sharp"	2
Mitral regurgitation slight	1
Cardio-respiratory murmur, systolic, second left	1
Cardio-respiratory murmur, systolic, mitral	1
Rough systolic murmur over aorta (case of syphilis)	1
Rate irregular, rapid on forced inspiration	1
"Soft" heart's action	1
Second apex sound markedly accentuated after exercise	1
Apex 1.5 cm. outside nipple line increased to 2.5 after exercise	1
Marked slowing of heart on holding breath	1
Heart enlarged; "alcoholic" for four days	1
Heart intermits every second to fourth beat, but becomes regular after exercise	1
Tachycardia, post-alcoholic (150)	1
Cardio-respiratory murmur noted on health record, not present	1
Mitral systolic murmur, marked on exercise	1
Rough mitral systolic sound	1

Many of these observations are unimportant, but were the things that impressed the examiner at the time. As all these men were doing hard duty in the Navy, this list illustrates the number of conditions that can exist in perfectly well men. The murmurs most noticeable in these cases and others examined are systolic at the second and third spaces at the left of the sternum. This is considered an exercise or an excitement murmur, possibly from slight dilatation of the conus arteriosus, the murmur soon disappearing. This murmur was often present before exercise, but in most cases appeared and was intensified by exercise. It was so frequent in occurrence that only the marked cases were noted. The next most common murmur was a slight mitral systolic murmur after exercise, 10 per cent in recruits and 4 per cent in reenlistments. Other murmurs were also frequent. In all 42 per cent of the recruits are noted as having a murmur or roughness of some kind and 19 per cent of the reenlistments. Most of these murmurs can be accounted for, in the opinion of the writer, by the increased heart action and slight dilatation, and were not accompanied by the other signs of heart disease. For instance, the murmurs at the left of the sternum were neither rumbling nor high pitched, and by no flight of fancy could they be attributed to mitral or aortic disease. Still it is quite certain that some of the murmurs will be present when the men are examined again, although the most of them will be heard sometimes and at other times there will be no trace of a murmur. It has been stated that exercise will produce a "piff-piff" in any man. It is true that there will be an increased heart sound, but nothing simulating

a murmur in all cases, as only 19 per cent of the cases of reenlistment showed any effects from the exercise.

One of the cases among the recruits who was discharged from the service by medical survey will illustrate the importance of heart murmurs when taken in conjunction with other findings:

Case S.—Special; recruit; apprentice seaman. Apex felt and seen in fifth space, 3 cm. outside the nipple line. Right side of heart 3 cm. from the mid-sternal line. Apex is 13 cm. from the mid-sternal line, and the nipple is 10 cm. from the mid-sternal line. Pulse rate 90, and after exercise is 120. Rhythm regular and forcible. Thrill absent. Apex sounds normal, except murmur. Aortic second accentuated for age. Pulmonic second greater than the aortic second and markedly accentuated. Murmur, best at apex, transmitted to back, systolic in time. Murmur increased by exercise, and heart's apex changes to the sixth space. A systolic murmur is also heard at the base, but its nature not definitely determined. Pulse compressibility normal; size of pulse wave normal, but somewhat sharp. Diagnosis: Mitral regurgitation, enlarged heart.

Recruit admitted after the examination that he had had attacks of precordial pain and also slight swelling of the feet at times. On discharge from the service in two weeks the condition of the heart was the same.

In the case just cited the heart was enlarged, as evidenced by the location of the apex and the probable enlargement to the right of the sternum. The pulmonic second was accentuated even for his age (18). There was a persistent systolic murmur at the apex, heard also in the back. While the condition of the heart might not interfere with work in civil life, there was an undoubted mitral regurgitation which would preclude his continuance in the service as a recruit, although the capacity for work in some men with heart lesions is remarkable. The above is fairly typical of the cases surveyed among the recruits.

In listening for murmurs it must be remembered that some murmurs, as systolic, are heard best in a prone position and may not be heard in a sitting or standing position, whereas presystolic murmurs are heard best in the sitting position. As a rule exercise brings out a murmur. The systolic murmur at the second and third space at the left of the sternum, heard so often on exercise or excitement, does not follow the rule of "systolic" murmurs, as it is not a true murmur, and it was found that it had a tendency to diminish when patient assumed the prone position, although heart apparently was beating just as forcibly. In cases where a thorough examination is necessary the recruit should be examined in both prone and standing position.

The one case of rejection in the reenlistments was as follows:

Mc.—, seaman. Has had one enlistment. Age 22. Heart apex outside the nipple line, fifth space. Nipple is 9 cm. from the mid-sternal line. Apex is 13 cm. outside mid-sternal line. Right side of heart is 3 cm. from the mid-sternal line. Pulse while sitting, 108; standing, 120; after exercise, 120. Pulmonic second accentuated. Loud systolic murmur at mitral, transmitted to the axilla. Murmur does not quiet on rest, and the same condition was present on another day. Without further study it can not absolutely be affirmed that there was a mitral regurgitation, although the classical symptoms are there; nevertheless there was a sufficient defect in the heart to prohibit the starting of a reenlistment.

Contrasted with the above is one who was accepted:

Case No. 47.—Reenlistment; age 28. Apex in nipple line, the previous case having apex 4 cm. outside the nipple line. Right side of heart 2.5 cm. from the mid-sternal line. Pulmonic second greater than the aortic second, but not markedly accentuated. Mitral systolic murmur. Pulse sitting, 84, previous case being 108; pulse standing, 90; after exercise, 114. This applicant had been indulging in alcohol the night before as a "last chance" before "shipping over," and it was considered that this affected the heart. The size of this heart was practically normal, and the murmur was negligible, as such murmurs were often found, the whole condition probably being due to alcohol. He had also served two enlistments and had probably had the same condition under similar circumstances in the past. He was examined for transfer in nine days. The murmur was much less marked and probably will not be found at times. The heart's apex had resumed its normal position inside the nipple line. Several cases were noted as having a "murmur" which, on examination in a few days for transfer, etc., showed no murmur.

Some of these cases will be noted later.

As a type of a perfect heart case No. 82 is cited. Examined for second enlistment; age 22. Heart's apex felt inside the nipple line, 10 cm. from the mid-sternal line. Nipple is 11 cm. from the mid-sternal line. Width of sternum at the lower border of the second intercostal space, 4 cm. Right side of heart is 2.5 cm. from the mid-sternal line. Weight, 184; height, 70 $\frac{1}{4}$ inches. Chest circumference, 38 inches; expansion, 5 inches. Pulmonic second is greater than the aortic second. Pulse sitting, 70; standing, 76; after severe exercise, 70. (Slow pulse of athlete after exercise—oarsman.) This case was noted as the "most normal" both in heart sounds and measurements. Perhaps the term "perfect" would be more appropriate, as it must be considered that men who are able to stand the strain of a life in the Navy have a "normal" heart, even if the heart is slightly enlarged or a fleeting murmur be found.

NOTES AND OBSERVATIONS.

The following notes were made at the time of the examinations and are given just as taken, they being observations which impressed themselves on me as I endeavored to work out this subject. In considering the heart conditions, their importance is emphasized by the fact that in life-insurance statistics, which are adding much to our prognosis in disease, 42 per cent of the deaths of the policyholders, excepting in the very young companies, are caused by diseases of the heart, blood-vessels, and kidneys. It is also considered that in the majority of cases these diseases are interrelated. About 43 per cent of the rejections are caused by the same diseases. Thus abnormal heart conditions in youth are at least predisposing causes. Our civilian confrères are inclined to disagree with the naval medical examiners as to the importance attached to slight heart abnormalities. They are right from their point of view, and it can not be denied that in instances in the Navy too much importance has been attached to "large hearts" and "murmurs," forgetting that oftentimes these conditions are temporary or compensatory. On the other hand, the naval medical officers are right from their point of view, as they must examine to obtain a man that can stand the strain of a hard life, one who must do a certain work and can not choose what he will do or how hard he will work, as does the civilian patient to a certain extent.

The naval service demands practically a perfect heart, which must stand the strain of hard work, sudden changes of climate, and, in the fireroom force the liability of heat effects. Thus conditions which need not be considered in civil life, being of no importance, may cause a breakdown later in the Navy. Slight heart abnormalities even from the naval medical officer's point of view do not always give rise to trouble, and many men are found performing their duty who would not be accepted as recruits were the same condition present. Service conditions account for many abnormalities, and when these are found in the recruit and cause doubt the best rule is to reject. When a man has passed through one or more enlistments, although he may have a heart slightly enlarged and a rough mitral sound, he has proved that as far as his work is concerned he has a normal heart and that the heart condition is compensating for the work in the service.

APEX BEAT.

In determining the apex beat care must be taken not to be misguided by the transmitted impulse, as a seeming impulse can be felt at times in the sixth space, which is really the transmitted beat from the fifth space through the rib. To be located accurately, the apex

beat must be actually felt, best by the flat tip of the index or middle finger. The space can be determined only by actually counting the ribs. Inspection is unreliable. In some cases inspection indicated the apex beat to be in the fifth, and it was found on counting to be in the fourth or in the sixth space. In other cases inspection indicated the apex beat in the fourth or the sixth space, and it was actually found in the fifth space. In a specific case the apex was so far below the nipple (7 cm.) that it seemed absolutely certain that the beat must be in the sixth space at least. The recruit, however, had a "long" chest, and actual count showed the beat to be in the normal fifth space. In other cases the apex appeared to be sufficiently high to be in the fourth space without doubt, but the actual count showed it to be in the fifth space.

In the Navy, and presumably, therefore, in any set of muscular men, the nipple in the greater per cent of cases is a good guide to the normal location of the heart's apex. In these men, who are as near one physical type as it is possible to get a set of men, some nipples are much higher or lower than the greater per cent, and therefore the only safe rule is to count the rib spaces.

In 93 per cent of the reenlistments and 85 per cent of the recruits the heart's apex was found in the fifth space. In one case there was a slight deformity of the sternum, and the second space was just above a ridge, which was more prominent than the ridge below which the second space is usually found. In locating the ridge from which to count the intercostal spaces at the junction of the manubrium and gladiolus a second ridge was often found below this, it being the junction of the first and second segments of the gladiolus and is at the point where the third rib joins the sternum. In some cases these two ridges might cause a wrong location of the apex beat. The above error can be easily avoided by counting the ribs from the first space, although this requires much greater care, and even with the two ridges found it is easy to determine the upper one at the second rib and count from that. Besides the space, the point farthest from the sternum at which the apex can be felt should also be determined.

At the beginning of these examinations the apex was located by palpation first, and then the location determined by light percussion, the eyes of the examiner being closed during this percussion, the assistant marking the point determined. It was found that in this type the apex could be accurately determined by percussion, the chest being passive and air expired. In the above manner it was found that light percussion would locate the apex beat accurately, whereas heavy percussion would not, it being probable that with the heavy percussion the lung and the structures around and below affect the note. The percussion and location of heart's apex were taken

with the candidate in the standing position. In one case (recruit) the apex was not felt at first as far from the sternum as it should have been, the case being one of mitral regurgitation, with a probably large heart. Percussion located the apex in this case at 11 cm. from the mid-sternal line, the nipple being 10 cm., palpation having located the apex at 8 cm., inside the nipple and apparently normal. On gentle exercise the apex was felt to be farther out even than determined by the percussion, and, making allowance for the outward moving of the apex on exercise, this percussion point was correct. This shows the accuracy of percussion in this type of case and how gentle exercise will sometimes bring out the apex beat; also that occasionally the apex may not be felt as far out as it should be. This case and the one following were the only ones of this kind in the 200 cases examined.

Case No. 71.—Recruit. Apex was felt 8 cm. from the mid-sternal line. Nipple was 9.5 cm. from the mid-sternal line. Patient had mitral regurgitation, with rapid pulse. Percussion gave the location of the apex at 9.5 cm. from the mid-sternal line; that is, in the nipple line. Exercise did not affect the determination by palpation, but it was felt that percussion in this case gave the more accurate size of the heart. In one case, or one-half of 1 per cent of the series the apex was never felt either before or after exercise. By percussion the apex was 9 cm. from the mid-sternal line; nipple, 10 cm. The candidate was not obese—weight, 137; height, 64 inches; chest expansion, 4 inches; pulse sitting and standing, 72; after exercise, 84. Pulmonic second slightly greater than aortic second. Right side of heart 2.5 cm. from mid-sternal line. It is felt that percussion located the apex accurately, as examination was otherwise normal and he had had an excellent health record.

In many instances the apex impulse can be seen, and although this visible impulse should be recorded it must not be taken absolutely as the location of the apex beat, since palpation and percussion may locate the apex from 1 cm. to 2.5 cm. farther to the left, and the point farthest to the left at which the impulse can be felt is the true location of the apex.

In another case the apex was not felt on palpation and only faintly after exercise. Candidate was obese; height 67 inches; weight 221 pounds. Percussion gave the apex as 12 cm. from the mid-sternal line, and the apex was felt there in the fifth space after exercise. The aortic second was accentuated. The right side of heart was 3.1 cm. from the mid-sternal line. There is no doubt that the heart was enlarged. Candidate was in his second enlistment, had a fine health record, and performed his duties well. Had this case been a recruit I personally would not have accepted him. The determination of the heart's apex in this case was the most uncertain in the series, and it

any obese man such as this the determination of the heart's apex by percussion is considered uncertain. Incidentally, the above man had gained 30 pounds in weight in three months while waiting to reenlist and this affected the above condition.

As a routine, the apex beat was palpated before and after exercise, a minute being allowed after the exercise for the readjustment of respiration and heart rate. While exercise caused a change in the location of the apex beat in many cases, other cases showed no change. The cases where the apex changed to a noticeable degree, as from well inside the nipple line to the nipple line or outside, or from the fifth space to the sixth space, were 16 per cent in recruits and 14 per cent in reenlistments. As stated before, it is considered that the excitement of examination will produce the same effect on the heart as exercise, and it must also be remembered that respiration affects the location of the apex slightly and position to a considerable degree, in some cases. In order to obtain the same conditions for comparison the candidates were examined in the upright position and with air expired from lungs, thus a passive chest. It is noted in several cases that although the apex was in the nipple line, which is parallel to the mid-sternal line, the measurement over the chest wall showed the apex 0.5 to 1 cm. nearer the mid-sternal line than the nipple. Thus: "Apex in the nipple line, 9.5 cm. from the mid-sternal line, nipple 10 cm." As the tape line was placed on the chest wall in these measurements, the contour of the chest wall at the cardiac area accounts for the difference in the measurements.

In obese patients the apex may not be found in the spaces not covered by fat and the breast has to be pushed aside, it being found that usually the fifth space was covered by fat, rendering the determination of the apex much more difficult.

The location of the apex beat has been especially noted on account of its importance. It should be recorded in its relation to the nipple line and also the distance from the mid-sternal line. In a heart examination it should be the first thing determined, and in some cases is the most important thing to know, determining a heart enlargement in cases where it is most important to decide whether the heart is enlarged or dilated. In muscular subjects—oarsmen, etc.,—a large heart was expected, and was found in the majority of cases. On the other hand, case No. 82 of reenlistments, quoted previously, a crew man, had no heart enlargement.

Case No. 57.—Reenlistment, also illustrates an athlete with no heart enlargement. Second enlistment; oarsman; age 23. Nipple fifth space, 10 cm. from mid-sternal line. Heart's apex in fifth space, inside nipple line, 9 cm. from the mid-sternal line. Right border 3 cm. from the mid-sternal line. Weight 160 pounds; height 69½ inches;

chest $34\frac{1}{2}$ inches; expansion 3 inches; pulmonic second greater than the aortic second; pulse standing and sitting, 70; after exercise, 66.

(Note.—Cardio-respiratory murmur noted on the health record is not found at this examination. A "perfect heart." In general, the cardio-respiratory murmurs are not important. The above also illustrates the "slow" heart often found in athletes after moderate exercise.)

The *right border* of the heart is best determined by light percussion, a similar method being used in this as in the determination of the heart's apex by percussion. The distance from the mid-sternal line is the standard, and to have a definite comparison the upper border of the third right costal cartilage—that is, the lower part of the second interspace—was taken as the point at which to percuss. In Gray's Anatomy this point is given as 3 cm. from the mid-sternal line, and in older editions as $\frac{1}{2}$ inch, or 1 cm. plus to the right of the sternum. The designation of so many cm. from the mid-sternal line is considered preferable, as the widths of sternums may differ and thus there may be a slight error as to the true location of the right side of heart if its location is dependent on the right border of the sternum. By actual measurements in this series the width of the sternum varied from 3 cm. to 4.5 cm.—a difference of 1.5 cm., or of $\frac{3}{4}$ of a cm. on each side. The second space was selected as the one quickly and easily located and percussed, although the third or the fourth space would have given a greater average distance from the mid-sternal line.

In the records of heart examinations the term "centimeters from the mid-sternal line," or "inches," as the case may be, is indefinite and should be explained more fully, as by the term "at the second right space" or "the third right space," etc.

At the upper border of the third right costal cartilage in this series the heart's border was defined as 2.4 cm. in recruits, and as 2.8 cm. in reenlistments. This is smaller than the anatomical description by 0.6 cm. in recruits and 0.2 in reenlistments, this latter being negligible. The greatest distance at the right was 4.5 cm. and the least 1.5 cm., the latter case having a sternum only 3 cm. wide and the dullness beginning just at its edge.

The average distance in the 200 cases was 2.6 cm. The sternal width was 3.75 cm.; thus the sternum extended one-half of this, or 1.875 cm., to the right of the median line. Therefore the usual distance of the right side beyond the sternum was 0.725 cm., which is practically one-third of an inch, or less than the usual finger's breadth. A dullness of more than 3 cm. from the mid-sternal line, or practically more than one-half inch from the right sternal border, would mean a slight enlargement at that point. In the cases with heart lesions in this series the right side averaged 2.75 cm.,

which is only slightly more than the normal cases, but one of these four cases was only 2 cm., or less than the average, and the average distance of this type of case was less than is usually found in the heart cases. This latter was verified by later cases examined. In this same set of four heart cases the apex averaged 1.27 cm. more to the left than the average case, and the nipple happened, probably by size of candidates, to average 0.2 cm. nearer the mid-sternal line, and thus the apex was 1.5 cm. farther to the left, which is an appreciable change. These cases were not severe, since they had slipped by the recruiting office without being detected, and thus no great heart enlargement could be expected.

Case No. 8 of reenlistments was passed with the right side of heart 4.3 cm. from the mid-sternal line. The apex was in the fifth space, 3.3 cm. inside the nipple line, and thus the heart was not enlarged, but possibly more to the right than usual. He was in his third enlistment and had an excellent health record. The pulmonic second was normally louder than the aortic second. There was a slight cardio-respiratory murmur, systolic, at the left of sternum.

The *heart's apex*, according to Gray, is 8 cm. from the mid-sternal line. It was found in this series to average 8.93 cm. at 18 years of age and 10.08 cm. at 27 years of age. The right side of heart at the third space should be about 3.5 cm. from the mid-sternal line, or $\frac{1}{2}$ cm. more than at the second space. Thus in the entire series the heart's area is slightly larger than is given in the anatomy, for although the right side is slightly less, the left side is sufficiently larger to make the entire area larger.

RELATION OF PULMONIC TO THE AORTIC SECOND SOUND.

These observations were taken before exercise, with chest passive and air expired. The relation of the pulmonic second to the aortic second sound can be interpreted as about the same as is found in the textbooks. In Cabot's *Physical Diagnosis*: "About half of 207 cases, between the ages of 20 and 29, showed an accentuation of the pulmonic second, while after the thirtieth year the number of cases showing such accentuation became smaller with each year, until after the sixtieth year we found an accentuation of the aortic second in 66 out of 68 cases examined." This latter would be 97 per cent.

In my series the pulmonic second and the aortic second were equal in 11 per cent of recruits, aged 18, and in 16 per cent of reenlistments, aged 27. Thus these figures could be divided between the cases having aortic and pulmonic second unequal; that is, in the reenlistments there would be 49 per cent having the pulmonic second equal to or greater than the aortic second, and 51 per

cent having the pulmonic second equal to or less than the aortic second. The recruits showed a smaller per cent with the pulmonic second greater than the aortic second than was to be expected prior to this study. In the first examinations cases were met in which no difference could be detected between the aortic second and the pulmonic second. These were examined very carefully in order to avoid a third designation, but the cases persisted with the equal second sounds and were thus honestly recorded. It is also reasonable to suppose that if the pulmonic second starts in childhood as more accentuated than the aortic second, and that in the later decades of life becomes less than the aortic second, there is a time when they are sufficiently equal to be unable to detect any difference by the examining ear. The cases in recruits with equal sounds averaged 17.7 years. The cases in reenlistments with equal sounds averaged 25 years. The oldest case with the above condition was 39 years old. The youngest was, of course, the youngest age in recruits, or 17 years.

The oldest candidate found with the pulmonic second greater than the aortic second was 42 years old. The youngest found with the aortic second greater than the pulmonic second was 17 years. In the series five were over 40 years of age. Of these 80 per cent had the aortic second greater than the pulmonic second. The relations from the ages of 30 to 40 averaged the same as from 20 to 30.

It was found that the relations of the second sounds were affected by exercise and excitement temporarily. Cases are noted in which the pulmonic second was at first less than the aortic second, became greater after exercise, and became less again after a slight rest. The same was also noted in case of mitral regurgitation. The opposite of the above also occurred in some cases; that is, pulmonic second greater than the aortic second, less after exercise or equal, resuming the original condition after rest.

Cases were also noted where both the aortic second and the pulmonic second were more accentuated than usual, and some where the aortic second was sharper and more accentuated than was to be expected. On the other hand, there were so many varied relations of the second sounds after exercise that they could not be considered of any importance when other symptoms were absent. We do not expect that a recruit of 17 will have the constantly accentuated aortic second of a man of 40, nor the diseased accentuation met in cardio-renal disease. The sharp accentuation of an old kidney case was not even simulated in this series.

MURMURS, IRREGULARITIES, PULSE RATE, ETC.

The pulse rate in this series was much different from what was expected, and also the pulse rate of the reenlistments was higher than that of the recruits. Of course the high pulse rate is due to a

great extent to the excitement of examination, and a simply rapid pulse rate was not considered important, it having been observed that a pulse rate of 90 on the day of examination was 70 the next day in many cases. Cases with a more rapid pulse should, however, be examined very carefully. One type of case invariably had a rapid pulse—the man who was shipping over or being transferred and who had considered the night before as “the last chance,” often noted as “alcohol last night.”

Case No. 75.—Recruit shows the result of excitement. Pulse sitting, 76; standing 90; after exercise 120; entirely normal. Usually the pulse begins to increase when the recruit stands up and the medical examination begins. The pulse rate increases still more after exercise, and this, taken in conjunction with a pulse that increases in rate from excitement even before the pulse is first taken, can account for the high pulse rate found. It was considered that the pulse rate was 8 or 10 beats higher than it would have been, even in the sitting position, had not the element of excitement entered the case. Other causes may also produce a rapid heart, as case No. 73, reenlistment. Pulse sitting 76; standing 94; after exercise 135. (NOTE.—“Convalescence tonsillitis and tonsillectomy; normal.” In this case there was a sufficient cause for the rapid heart. Also case No. 88, reenlistment. Pulse sitting 84; standing 96; exercise 120. He stated he had “been wrestling a bag and hammock” for transfer, and thus naturally had a rapid heart.)

Case No. 63.—Reenlistment. Pulse intermits every second or fourth beat. Heart normal. Pulse becomes regular after exercise.

Case No. 59.—Reenlistment. Seaman, third enlistment, age 26. Pulse was 120 standing and 135 after exercise; “tic-tac.” Apex was 10.5 cm. from the mid-sternal line, 1 cm. outside the nipple line. (NOTE.—“Alcoholic tachycardia.” The aortic second was accentuated. He was held for observation for two days and then passed with notes. He was starting his third enlistment, and had a good health record. A further note was made in the case: “From the later examinations it is doubtful if he should have been passed.” Alcohol was considered the cause of the tachycardia, and as the alcohol continued while he was waiting for transfer the tachycardia continued, although he performed such duties as “working parties,” etc.)

The “tic-tac” is not considered here in the pathological sense as coming from an uncompensated heart. It had been found twice previously in men who were able to perform their duties and had no symptoms. The term was used where the heart’s sounds equaled each other, as the name implies.

Case No. 29.—Examined for transfer; was in his second enlistment. Pulse 120 to 140 after exercise. Apex 13 cm. from mid-sternum, nipple 11 cm. Pulmonic second was accentuated. A

"tic-tac" heart was present, but disappeared after exercise. It was considered that the condition was not pathological, as he had an excellent health record and was then performing his duties. It is questioned if the psychical effect of the excitement did not produce the rapid pulse before exercise, and the "tic-tac" condition.

Case No. 51.—In second enlistment. Pulse 94 to 120 after exercise. Apex 11.5 cm. from mid-sternum, nipple 10 cm. Aortic second marked as accentuated. Sounds at apex equal. "Tic-tac" excitement.

These last two cases were examined earlier in the series than case No. 59, where the irregularity was supposed to be due to alcohol and excitement, and as the alcohol was continued it could not be determined just how much it affected the "tic-tac." He was able to perform his duties in the third enlistment and had a good health record, and thus it could not be decided that he was unfit for the service. It is probable, however, that case No. 59 will be under the surgeon's care if the alcohol is continued.

These "tic-tac" cases presented the following in common: First and second sounds equal at apex, "tic-tac," rapid heart, and also a distinctly enlarged heart. With this combination of symptoms it is considered that these hearts require further observation and study.

Among the cases of "tic-tac" hearts in the recruits, No. 54 was also associated with an enlarged heart, and pulse 102 to 124. He had, however, a "poor physique and bronchitis." The only murmur present was a slight systolic one at the right of the sternum, third space: diagnosis undetermined. He was invalided from the service by medical survey. Another case among the recruits, No. 63, was noted as "tic-tac," but in this case the high pulse was 96 and the heart was not enlarged. The aortic second was accentuated after exercise, but otherwise the examination showed a normal condition, and the recruit was passed.

One recruit had a mild brachycardia, pulse 54, and remained the same after exercise. No evidence of any drugs.

Case No. 22 of reenlistments illustrates the effect of excitement at the beginning of the examination and the normal condition after this has passed. Pulse 90 sitting, 100 standing, and 78 after the examination and exercise. He was not an athlete, who are found, as a class, to start the examination with a slow pulse and are generally not much affected by the exercise or excitement.

Two cases in recruits are noted with slightly irregular hearts; not important. One case is noted with marked slowing of the heart on holding breath, and six cases of reenlistments, athletes, having slower pulses after exercise than before.

The above were the only irregularities in rate noted.

RHYTHM AND MURMURS—NOTES AND OBSERVATIONS.

Sharp first sound at the apex was heard in four cases of reenlistment and was considered of minor note except in one case that also had an enlarged heart. This sound was considered a temporary neurosis and not connected with either cardiac weakness or an enlarged left ventricle. There were also recorded many changes in rhythm in these examinations, and in minor notes were recorded the second sound at the apex becoming sharp, the pulmonic second from being normal to becoming sharp, and the same with the aortic second. "Booming" first sounds at the apex and "soft" apex sounds are recorded. Naturally under exercise both sounds at the apex become more marked, and this called for no special comment. No cases were recorded of the apex sounds becoming sharp or accentuated beyond the "sharpness" noted of the aortic second sound, on which the second sound at the apex depends.

The most marked deviations from the normal in rhythm were the changes of the aortic and the pulmonic second sounds. As far as personal experience goes, this series shows that any sound could be accentuated individually without indicating anything pathological.

Doubling of sounds, aortic and pulmonic seconds, was noted in several cases, due probably to the varying influences of the examination. This was noted as "interesting, but not important." In one case, a recruit, the doubling may have had some significance, it being associated with an enlarged heart, and all cases of large heart were looked upon with suspicion until evidence was adduced that they were all right. This case had a marked systolic murmur at the right of the sternum, rough mitral systolic, persistent bronchitis with elevated temperature, "cogwheel" breathing, poor physique. Examination of sputum negative. He was discharged from the service by medical survey. In this case the doubling of the second sounds at the base persisted at all times, and was probably due to disturbed pulmonary circulation. He also had an irregular heart. This recruit had so many physical defects that the doubling was of minor importance.

A *murmur* of some kind was heard in many cases; in the recruits 42 per cent, and in the reenlistments 19 per cent. This is perhaps the most important observation made, and at the end of the series these conclusions were noted: The mitral systolic murmurs heard in these examinations are not important unless they have the marked and constant accentuation of the pulmonic second, and are also accompanied by enlargement of the heart. In the latter case the condition may be "relative" and temporary, and these cases should be observed for several days. Even in the recruits the murmurs alone mean nothing without other signs of physical disabilities, and

the chances are that the next surgeon who examines some of these cases will not find the murmur, because it has disappeared.

Of other murmurs the most constant is a systolic one at the second and third left interspaces near the sternum; also heard sometimes in the fourth or fifth space, sometimes before exercise as well as after exercise, and more often only after exercise; of no importance except to show the influence of exercise or excitement on the heart's action or the presence of murmurs in normal hearts. This statement is based on the facts that these murmurs occurred in men who could do a hard day's work, who were apparently normal in every way, and that often on reexamination of the same cases later the murmurs had disappeared, which would show that these sounds often appear in normal hearts.

Since writing this article an interesting paper has appeared in the Archives of Internal Medicine, XIV, No. 4, by George Blumer, M. D., entitled "A Note on the Normal Peculiarities of the Heart Sounds in the Region of the Sternum." This sound might be described as an "xiphosternal crunching sound." In the discussion the following is quoted:

Osler, in his brief discussion of Hare's paper, is the only observer, as far as I have been able to discover, who notes that the sound is found in the majority of healthy subjects.

In the conclusion of the paper it states:

For this reason I think it important that it should be recognized as a physiological phenomenon.

This is quoted to show the sounds that can be heard in healthy subjects. In connection with the above it was noted in this series that there was a case with a double murmur at the left sternum, murmurs at the right of the sternum as far down as the fourth space, and also murmurs heard at both the right and the left of the sternum systolic in time.

Cardio-respiratory murmurs were so fleeting in this series that they were marked as "not important."

In some cases of recruits the less important things have to be considered, as in recruits for coal passers, who have to be especially selected on account of their work, and are also older men.

Case 36, in the recruits, illustrates this type of man.

Recruit. 30 years old, for coal passer: Heart's apex was 2 cm. outside the nipple line, in the fifth space, and, after exercise, the sixth space. A constant mitral murmur was heard, but no other symptoms, hardly enough to diagnose a mitral disease. He was, however, not considered suitable to begin life in the Navy as a coal passer and was surveyed from the service. Personally I should have passed him had he been in the second or third enlistment. It is

noted also that often on board ship men from deck as seamen apply for transfer to the rating of coal passer and are often "not physically qualified."

Case No. 10.—Reenlistment; Japanese steward; was recorded as having a "slight mitral regurgitation." Apex outside the nipple line, pulmonic second accentuated, mitral systolic murmur. Slight bronchitis was present, which was considered a factor in the case. While awaiting transfer he was examined several times, and on these occasions the murmur could not be heard in every position, but could be obtained after exercise with passive expired chest. He developed a cough and was sent to the hospital for observation. On return from the hospital the murmur had disappeared and the apex was in nipple line. Twelve days after this the apex was inside the nipple line and heart normal.

This last case quoted shows the temporary character of some of these cases.

Case No. 18.—Reenlistment; had a systolic murmur at the second and third spaces at the right and left of the sternum, with a slightly enlarged heart. He was a fireman with a good health record, and the condition was not considered pathological. The condition was noted on the health record and candidate passed. Also case No. 33, reenlistment, seaman, had a slight mitral regurgitation with history of rheumatism in the service. He was passed, as what little trouble there was in the heart would probably not affect his duties, and it was also a question whether the condition was not a temporary relative one.

Case No. 97.—Recruit; had a slight mitral systolic murmur after exercise. He was passed, as the heart was normal in other respects, and there was a slight acute bronchitis present, which he had contracted overnight on the receiving ship while waiting for the "verification" examination.

In most of the recruits a roughness could be found at the second and third space at the left of the sternum if they were made to exercise a little longer and harder. This could be due to a temporary dilatation of the conus arteriosus. Only the marked cases of this murmur are recorded in this series. It is also the opinion of the writer that some of these cases could be termed "psychic."

The heart murmur persisting but becoming less is illustrated by case No. 47, enlisting for the third time. On February 11 the heart's apex was in the nipple line, 10.5 cm. from the mid-sternal line; the pulmonic second was accentuated; pulse 84, becoming 114 after exercise. Slight mitral systolic murmur. "Alcohol last night" accounted for the heart conditions. On February 16 the heart was the same, as he was having regular liberties and a certain amount of

alcohol was continued. Pulse was 120 at times. On March 11 the case was transferred. Pulse was 84. Heart's apex inside the nipple line and only a very slight murmur persisted. It was considered that the heart's condition was becoming normal. It is probable that in my early career in the Navy I should have called this a case of "mitral regurgitation," whereas there was really no heart disease.

The following notes are made on a case which was examined after this series was completed: On account of a large and intermittent heart and poor physique, a heart condition was suspected. During the usual examination a murmur was not heard, only a slight roughness with the mitral systolic. On examining him lying down the murmur was easily heard; in fact, it was only in the prone position that a true murmur could be heard. This was a recruit, and he did not improve under observation of several days, and was discharged from the service by medical survey.

These cases illustrate the murmurs heard in the series. Many of these conditions hardly seem worth mentioning, but they illustrate many of the "heart murmurs" often recorded.

The pulmonic area may well be termed the "region of romance," although in this series no thrill was felt and only one or two cases observed in which there might be a relative insufficiency such as accompanies a mitral stenosis or occurs after severe exercise. The same thing can practically be stated in regard to the mitral systolic murmurs, which are considered temporary or relative, and have been heard many times due to excitement or exercise. They are considered to be the same as those appearing often in acute disease which soon disappear as convalescence begins, except that in this series they disappear overnight oftentimes. It can not be stated absolutely that some of these cases quoted as "relative" or "normal" may not have had a slight mitral regurgitation, for instance, and not a mere temporary condition. Continued observation is the only way this question could be determined, but so many men are found on board ship with these conditions who have absolutely no symptoms of any kind that fairly good evidence is thus at hand that these different murmurs found are of no importance. The future history of such cases would give much valuable information and add much to our knowledge of the significance of these slight murmurs. It is thus evident that all murmurs, heart enlargements, and accentuated sounds should be recorded and observed in the health record in some routine prescribed manner.

Since making these notes I have had an opportunity to examine men during a year on a cruising battleship and have followed out the same examination, except that on board ship; on account of the vibratory conditions, the examination is not as satisfactory. The

same conditions of hearts are found—rapid hearts, slightly and markedly enlarged hearts, murmurs at the second and third spaces at the left of the sternum, and a mitral systolic murmur in many cases, which often persists even in a perfectly normal man, as far as his ability to undergo work and hardship is concerned. On the other hand, there are many men whose heart sounds do not change at all under examination and excitement; that is, the nervous element does not enter. The slight heart murmurs mentioned in this paper occur so frequently when hearts are carefully examined that they can be considered as normally present.

"Recruit, poor physique; may develop." This is given as a note taken on a case during this series, and after seven months this same case was back on my hands under "observation" as an ordinary seaman on board ship, having passed through the training station at Newport.

Case: Recruit; age 19; height 71½ inches; weight 118 pounds; chest circumference 31 inches; expansion 3 inches; heart "soft action," normal, apex in nipple line. No accentuation of sounds. He was being examined at this time, November, 1913, at the receiving ship at Boston for verification and was passed along with the following note:

On examination for verification found not to be a good physical specimen. Chest is flat; there is increased vocal and tactile fremitus to fourth rib, right side; slightly bronchial breathing; high arched palate; adenoids. He is passed with the possibility that he may develop.

He did "develop," but the wrong way, as follows: "Bronchitis acute;" "readmitted, bronchitis acute;" "influenza;" "tonsillitis, acute follicular;" "readmitted, tonsillitis, acute follicular (abscess)."

I had passed this man partly in the hope that he might develop, and also because I hesitated to call a medical survey on a man who had been only one day in the service; that is, the day before he had been found physically qualified for the service at the recruiting station in Boston. In the seven months following enlistment he had had 60 sick days, and had been noted by two different medical officers as "undesirable" for the service. He was sent to me for examination by the commanding officer of the ship, who had noticed his physical condition as being very poor. To date he is the same physically, and will have to be discharged from the service by medical survey. He should never have been enlisted, and, in fact, when he was informed that he would not be entitled to a pension, as his physical condition antedated his enlistment, he very properly asked, "Then, why did they enlist me?" This case was one I should have surveyed on verification, thereby avoiding the necessity of surveying him now, after seven months of care in the Navy.

When in doubt, reject. Some cases will be rejected who might "develop," but there will be many more among these who would never develop and be only a burden and expense to the Navy. This case also illustrates that the conditions found as above are much more important, as far as a cause for rejection is concerned, than many of the so-called "heart murmurs."

In considering the "normal" heart and its capacity for work, the capacity for work of hearts with true heart "lesions" has often been noted, as a heart having a well-marked aortic regurgitation or insufficiency, which is considered a most disabling factor. Dr. C. Aubertin (Paris) reports that out of a small number of patients he had observed five, aged 20 to 30 years, who, though affected with aortic insufficiency, had passed without accident through campaigns in the present war. None of them had showed edema, arrhythmia, crisis of angina, symptoms of congestion of the lungs, asystolia, or increase in the size of the liver. This illustrates what serious conditions can be compensated for, and how, as long as the compensation lasts, work can be performed. Less serious lesions can be compensated for more easily and for longer periods, and many men go through life with a mild mitral regurgitation, performing hard work and in no way incapacitated by the heart condition. This has also been seen in officers and men of the Navy. It has seemed that too much importance has been placed on slight murmurs that are either well compensated or which do not really constitute true heart disease so far as capacity to perform work is concerned. Of course there are cases sufficiently serious to prohibit active duty at sea, as a case of aortic insufficiency whose compensation may fail. One such case remains very prominently in my memory of experiences on board ship—a master-at-arms whom I had had no occasion to examine and in whom I noticed one day the marked pulsation in the carotids as occurs in advanced cases of aortic regurgitation. On examination the advanced picture of this disease was found, even to the "pistol shot" sounds in the femorals, and compensation had practically failed. He had, however, been performing his daily duties and had never reported for any symptoms or treatment; his compensation up to that time had just carried him along. He was transferred to a hospital and died in about 10 days. Such a case should not have been at sea, and illustrates a thoroughly "abnormal" case, which subject is intended, however, for another paper.

In considering the "normal" heart it is conceded that there is no concrete standard, and that any one individual can not establish an absolute normal. Further, that a standard can only be established by individual experience after many examinations and much data. There are very few whose lungs on examination do not exhibit something that deviates from what would be considered the normal.

There are a great variety of breath sounds and voice sounds in normal individuals, and the more these are studied by an observer the more he is able to distinguish them and find them; that is, he develops his ability individually in this particular. The same is true of the results of a heart examination, and what is found depends much on individual equation; that is, the skill and the experience of the examiner. Although different examiners might not agree as to the interpretation of the findings, there will be many things observed in common that will help to establish certain standards. It was with this in view that this study was undertaken—to attempt to find a standard or to eliminate unimportant things.

The slightest deviation from a supposedly normal heart was recorded. Most of these deviations would not be noticed in a routine examination, but when looked for they can be found, and as they occur so frequently in normal men they can be disregarded as far as attaching any importance to them is concerned. The following must always be guarded against in isolated examinations: A man is examined and the heart is found to be normal in every respect—no murmur, no increase in size, no accentuation of sound. The same man may be examined on another day, or may be examined by another medical officer, and a seeming mitral systolic murmur is found at the apex. It generally means nothing, as is shown by a series of examinations. If constant it can not be ignored, but it is only a part of a clinical picture, and to diagnose a mitral regurgitation there must be repeated thorough examinations, with the other signs of mitral disease and the clinical symptoms, and even then we may not be sure of there being an organic disease as opposed to a functional one. It is the opinion of the writer that this paper illustrates why it is that a medical examiner "misses" a heart "murmur" in some cases, according to the opinion of some future examiner or board. These "murmurs" appear and disappear and might not be present at the first examination, yet conditions would be such that at the second examination one of the temporary murmurs would appear. The converse of the above is also true. This does not apply to cases where there are constant murmurs which are easily overlooked unless the examiner has trained himself to detect these murmurs, which are constantly present and may require a certain position or gentle exercise to bring out, as illustrated previously in this paper.

This paper deals with what might be called the "first principles" of heart examinations, and is confined mostly to the information gained from notes in a series of cases examined which were practically normal. After the examination of these 200 cases it is felt that the following should be recorded in even "normal" examinations: The location of the heart's apex as to the space in which it is felt, and its distance from the mid-sternal line, with the distance

of the nipple from the mid-sternal line. The relation of the pulmonic second and the aortic second would be of value in the future examinations in the Navy, as well as the determination of the right side of the heart, but this latter should be determined by "light" percussion and would vary slightly with different examiners. Still a distinct enlargement to the right would be found by all observers. Any murmurs heard should be recorded in order that they could be referred to in future examinations.

CONCLUSIONS AND OBSERVATIONS.

1. The apex beat, which is the most important guide in determining the size of the heart, should always be defined. In a series of 200 cases it was found in the fifth space in 89 per cent, in the sixth space in 8 per cent, and in the fourth space in 3 per cent. The apex beat can be felt in all but 4 per cent of cases before exercise and in all but one-half of 1 per cent after exercise.

2. The apex is, on the average, 9.165 cm. from the mid-sternal line, and the nipple is 10.28 cm. from the mid-sternal line. The apex averages 1 cm. inside the nipple line.

3. In $67\frac{1}{2}$ per cent of cases the apex is inside the nipple line. In $10\frac{1}{2}$ per cent the apex is in the nipple line. In 12 per cent the apex is outside the nipple line.

4. In recording the location of the heart's apex, on account of the different shapes of chests, it is best to give the distance in centimeters from the mid-sternal line. These measurements are obtained by marking on the chest and then measuring between the lines by a tape laid on the chest and not by trying to estimate the distance between finger points holding the tape. With the tape flat on the chest the distance of the apex beat from the mid-sternal line can be taken accurately.

5. The right border of the heart is best determined by light percussion. It is easiest to estimate in centimeters from the mid-sternal line, at the lower border of the second right intercostal space, measured from markings on the chest. It averaged 2.6 cm., or 1 inch, from the mid-sternal line. With a sternum of average width the right border will be found about 0.7 cm. (or about $\frac{1}{4}$ inch) from the right border of the sternum, and as this distance is rather too short to estimate by the usual percussion on a finger, it is best to assume that the right border of the heart extends at this point to just outside the sternal margin. The location of the right side of the heart may vary slightly with different observers, as its estimation depends somewhat on individual equation, as does the general outline of the heart if determined by percussion.

6. The rate of the pulse on examination is accelerated by excitement, which seems to affect the men in reenlistments as well as those in the first enlistment. The pulse is increased by exercise (10 "sweeps") about 10 beats per minute in recruits and 7 beats in the reenlistments. One minute's rest is given after the exercise before the pulse is recorded.

7. Heart murmurs in these cases seldom mean an abnormal heart or "heart disease." Distinct murmurs are found in 42 per cent of recruits and 19 per cent of reenlistments. The most common murmur is a systolic one at the second or third intercostal space at the left of the sternum or a systolic murmur at the apex. With the latter murmur, even in the presence of an enlarged heart and an accentuated pulmonary second, there is not necessarily an organic heart disease. The condition is more often temporary and relative and the murmur may vanish in a day. These murmurs should be noted and observed, but not diagnosed heart disease unless other symptoms are persistently present. The "murmur" should not be the only thing sought for in a heart examination, and a murmur alone can not constitute a heart disease.

SURGICAL DIAGNOSIS AND TECHNIC INVOLVING THE APPENDIX.

By A. M. FAUNTLEROY, Surgeon, United States Navy.

The diagnosis of appendicitis from other abdominal conditions is largely dependent upon the character of the attack, as regards acute or chronic manifestations; the location, duration, and intensity of the symptoms; and the variety of appendiceal pathology present, with reference to the local or constitutional phase of the disease.

In the acute variety of cases the attack, unless fulminating, is usually characterized by certain premonitory symptoms indicative of abdominal distress: such as generalized colicky pain which lingers for a longer or shorter period in the epigastric or umbilical region, but sooner or later localizes over the usual site of the appendix in the right iliac region; tenderness in the latter region, with more or less right rectus rigidity following the localization of the pain over the appendix; slight nausea or vomiting in the early hours of the attack; a history usually of constipation, though diarrhea not infrequently is present; and other indications of intestinal indigestion, such as flatulence, anorexia, furred tongue, headache, and malaise.

As the attack progresses, in from 10 to 30 hours, there is more pronounced evidence of right iliac trouble, such as increased tenderness and right rectus rigidity, usually accompanied by flexion of the right thigh on account of splinting of the right psoas muscle. Following this the temperature is slightly elevated and the pulse quick-

ened. The so-called appendiceal colic may now become very distressing, causing the patient to complain bitterly of the right iliac pain, while slight nausea and vomiting may again be in evidence. This description would apply to the so-called catarrhal type of acute appendicitis, and with the exception of the slight fever and quickened pulse there is little or no constitutional involvement. It is to be noted that the order in which the symptoms occur is of diagnostic importance in that the pain *precedes* the nausea, fever, and localized tenderness in appendicitis, whereas if the reverse condition is present it is very probably not appendicitis.

The pathology of catarrhal appendicitis is usually referable to a mechanical obstruction somewhere along the lumen, caused by a swollen mucous membrane, a fecalith (foreign body), a kinking of the appendix, or all three combined, resulting in a distention of the distal portion of the appendiceal lumen with an accumulation of mucus, small fecal masses, epithelial debris, and bacterial growth. The appendix may be able to discharge its contents as a result of the subsidence of the inflammatory condition, but unless this happens within a variable short period of time there is an increased congestion and stagnation which may so interfere with the meager blood supply as to lead to localized gangrene and perforation, or generalized gangrene and sloughing. In either of the latter conditions, which are usually preceded by a plastic lymph exudate in the neighborhood of the appendix, there are manifested the symptoms of local peritonitis, or in the graver cases general peritonitis, which latter is usually the result of very much lowered bodily resistance or high bacterial virulency, or both combined.

In the fulminating type of acute appendicitis there is usually little or no premonitory warning, the attack being ushered in by excruciating pains in the right iliac region, with marked tenderness in same area, usually over McBurney's point; distinct right-sided rigidity; nausea and vomiting; a decided constitutional involvement, as shown by several degrees of fever, a rapid and wiry pulse, and a leukocytosis of varying amount, depending upon the patient's systemic resistance and the imminence of perforation. The pathological condition is one of marked congestion and thickening of the entire appendix, which may be from practically the same cause, though very much more quickly acting, as noted in the pathology of the catarrhal type. Whether from slowly or quickly acting causes a perforation or gangrene of the appendix is accompanied by symptoms which indicate either localized peritonitis, with usually late pus formation, or general peritonitis and a rapid display of grave manifestations. A perforation usually follows a localized necrosis which, starting on the mucous surface, penetrates the outer coats of the appendix as a result of a circumscribed devitalization caused by

bacterial activity, interference with the blood supply, or continuous pressure from within, due to a fecalith or foreign body. Gangrene of the appendix may involve the entire organ or only a part, and is the result of passive congestion and ultimate strangulation of the blood supply. In this manner infective agencies reach the peritoneal surface or bacteria may pass through the devitalized wall of the appendix and, as already indicated, a local or general peritonitis results.

A localized peritonitis occurs when a plastic exudate is thrown out in the immediate neighborhood of the perforation or gangrenous area and walls off the infection from the general peritoneal cavity. The peritoneal surfaces of the surrounding coils of intestine adhere together and the adhesions thus formed limit the inflammatory process. This latter process may be of a very limited character, when the organisms involved are not especially virulent, and resolution of the inflammatory products may take place with a consequent closure of the appendiceal opening by adhesions to an adjacent peritoneal surface. On the other hand pus may, and usually does, form in localized peritonitis, which is restricted from spreading by surrounding adhesions. This formation of pus may vary within wide limits and cause a disturbance in proportion to the amount present and its virulency. When perforation occurs the tension in the appendix is relieved and the acute symptoms, pain, tenderness, and rigidity, usually subside if the appendix has been walled off by the plastic exudate. If only a small amount of pus forms, as a result of perforation, it may be slowly absorbed, giving rise to symptoms of mild sepsis. Should, however, the abscess persist, a mass may be palpated in the right iliac region, which is composed of the appendix, localized pus, omentum, and inflammatory exudate. The symptoms in this condition are variable. In the milder cases there may be little to indicate the localized abscess except an indefinite mass and dullness in the appendiceal region. A slight irregular fever, with a possible evening rise, headache, anorexia, furred tongue, and constipation may be the only symptoms, unless tension in the pus sac increases or the abscess spreads, in which case there is a recurrence of marked pain, tenderness, and rigidity. The temperature may mount several degrees and the pulse assume a hard, wiry character with increased frequency. Leukocytosis is now marked, with decided increase in polymorphonuclears, while nausea and vomiting, with moderate distention, completes the picture of abdominal distress. When the appendix is retrocecal and entirely covered by the colon, the tenderness and rigidity are usually much less marked in the different stages of appendicitis, although the other symptoms are as apparent as usual.

In sudden perforation or rapid gangrene the temperature falls, the pulse becomes very rapid, and profound shock or general collapse ensues. Abdominal distention is now marked, pain and tenderness increased and generalized, and hiccoughs may begin. The rapid onset of general peritonitis is now apparent, to be followed by the symptoms of grave septicemia. Should the pus from the limited abscess become liberated into the peritoneal cavity as a result of sudden pressure or muscular effort the symptoms of spreading and generalized peritonitis follow in the same manner as noted above. The abscess, however, may rupture into an abdominal viscus, or it may travel extraperitoneally behind the ascending colon, or there may be a retroperitoneal lymphangitis which in turn may lead to subphrenic abscess or abscess of the liver.

An acute attack may subside, as already indicated, with usually a feeling of soreness lingering in the neighborhood of the appendix for a longer or shorter period. An appendix which has once been affected is liable to a recurrence, depending on the severity of the first attack and the general condition of the appendix after the attack subsides, with reference to external adhesions or bands and internal stricture or general narrowing of the lumen. The next attack may be of a more aggravated character on account of the condition left after the first attack, or the appendix may slowly evolve a subacute or chronic inflammatory condition which causes fibrous tissue to develop, in varying degrees of quantity and density, in and around the appendix. Such an appendix would be subject to exacerbations and give rise to a variety of symptoms indicative of chronic gastro-intestinal disturbance, which, if prolonged in character, would be accompanied by a state of more or less depression and lowered vitality.

The presence of certain bands or membranous veils in the abdominal cavity have given rise to a train of symptoms, referable to a chronic intestinal stasis, induced by kinking or constricting the gut at different points. These bands, known as Lane's bands, may be situated at the duodeno-jejunal junction or near the ileo-cecal junction and cause an angulation of the gut known as Lane's kink. At the ileo-cecal junction these bands, besides pulling on the ileum or cecum, may involve the appendix in the angulation process and may so interfere with the discharge of its contents as to lead to the development of an acute or chronic appendicitis in addition to the general symptoms of intestinal stasis. The membranous veil, known as Jackson's membrane, may spread over the cecum or ascending colon from the adjacent outer abdominal wall and by restricting its movements cause a stasis and dilatation of the lower part of the ascending colon. This condition, as well as Lane's kinks, may cause

a chronic intestinal indigestion induced by stasis, and may lead to involvement of the appendix in the general intestinal condition. Jackson's membrane may also cause stasis in the ascending colon by its presence near the hepatic flexure, inducing an angulation of varying degree in the transverse colon at this point. The lowering of the general and local resistance caused by chronic intestinal indigestion and constipation may lead to the development not only of appendicitis, but, as claimed by Lane, to gastric and duodenal ulcer and to several other conditions attendant upon diminished vitality. The existence of the bands and veils may not only be suspected by the chronic symptomatology of intestinal indigestion and stasis, but in many instances their presence may be diagnosed by a bismuth meal and enema, followed by a series of roentgenograms, which will indicate a kinking or dilatation, or both, along the intestinal canal from the lower few inches of the ileum throughout almost the entire length of the colon. It is of great importance to diagnose and locate the position of these bands and veils in view of their usual intimate and etiological relationship with appendicitis and other intestinal conditions. While they may be of embryonic origin, or slowly developed in infancy, as claimed by many, the same general condition might arise from adhesions along the intestinal tract as the result of appendicitis or ulcer formation. As Eisendrath has pointed out, the membranous veils may be an effort on the part of nature to correct a tendency to enteroptosis, and when this is apparent only such surgical measures should be undertaken as will relieve a local kink or constriction.

The diagnosis of appendicitis is not always clearly defined, as there are quite a number of abdominal conditions with which it might be confused. Not only is this true of acute manifestations but it is oftentimes very difficult to differentiate the chronic symptom-complex of a long-standing case.

Typhoid fever, at times, may simulate appendicitis. In this disease the temperature is usually distinctly higher than in appendicitis, and while there may be pain and tenderness in the right iliac region in typhoid, the definite muscular resistance would be lacking to differentiate it from appendicitis. It is true that marked tenderness and rigidity may be almost lacking in retrocecal appendicitis, but localized pain and leukocytosis would differentiate it from uncomplicated typhoid. In the latter condition not only is there no leukocytosis but an early blood culture might clear up the situation as regards typhoid and a slowly developing or chronic appendicitis.

An inflammatory condition of the spermatic cord has been diagnosed appendicitis. Here the history of the case, with a previous or existing epididymitis, and the lack of rigidity or deep-seated pain and tenderness over the appendix would rule out appendicitis.

Acute intestinal obstruction, especially intussusception, may be confused with appendicitis. In acute obstruction, as in appendicitis, the pain is usually appreciated about the umbilicus, but in the former condition it remains in that situation and does not shift to the right iliac region. In acute obstruction early shock and distention are marked, which is not the case in appendicitis unless perforation and peritonitis occur. The temperature is usually subnormal in obstruction, whereas in appendicitis there is nearly always some febrile manifestation. Constipation is absolute and vomiting persistent in acute obstruction, while these symptoms do not obtain in appendicitis.

Renal colic might be mistaken for appendicitis. Here the usual extreme severity of the pain, caused by the passage of the stone in the ureter, together with a radiation of the pain to the right groin, testicle, or inner side of the thigh, would be against incriminating the appendix. Muscular rigidity is not unusual in renal colic, but the absence of persistent pain and tenderness over the usual site of the appendix, the presence of macroscopic or microscopic blood in the urine, the absence of leukocytosis and fever would practically rule out appendicitis. Later on the X-ray plate may show the stone anywhere along the upper urinary tract. In coral stone of the kidney, or stone in the pelvis, the pain is referred to the loin, and besides a lack of constitutional involvement, there would be hematuria and a history of renal disturbance. A movable kidney, with a kinked or twisted pedicle, may cause deceptive right-sided pain, but palpation, together with a consideration of the urinary symptoms and the absence of the cardinal signs of appendicitis, namely, localized pain, tenderness, and rigidity, would eliminate appendicitis.

Gall-bladder trouble, especially of long standing, may cause diagnostic uncertainty as regards appendiceal involvement. The two conditions may be confounded when the cecum is situated higher than normal and the appendix becomes adherent to the gall-bladder; or when the latter is distended and inflammation is present, together with right-sided rigidity, it may be difficult to distinguish between cholecystitis and appendicitis. Again, these two conditions may be coexistent and the tip of the appendix may adhere to the distended gall-bladder. In ordinary gallstone colic the onset is sudden and violent, with epigastric pain, tenderness, and rigidity, and a tendency for the pain to radiate toward the right shoulder. Pressure directly over the gall-bladder causes increased pain and muscular spasm, and the vomiting is usually more violent and much more persistent than in appendicitis. In that appendicitis is regarded as a causative factor in cholecystitis, and inasmuch as the chronic gastro-intestinal symptom-complex may be practically the same in long-standing

cases, it may require prolonged and searching inquiry to bring out points of differentiation. Having narrowed the diagnosis to appendicitis or cholecystitis, a careful consideration of the onset of exacerbations may be illuminating. A recent or remote history of jaundice, together with an increase of symptoms *without* dietary indiscretion, would point to the gall-bladder, while an accentuation of symptoms in connection with imprudent eating would indicate the appendix. Again, the history of an ague-like attack, in which a chill and fever are present, would betoken gall-bladder rather than appendiceal involvement. In those cases, where it is probable that a cholecystitis has followed or become engrafted upon a chronic appendicitis, and in the cases where the usual anatomical arrangement is disturbed it may require an exploratory operation to determine accurately the pathology present.

Gastric and duodenal ulcer, when perforation occurs or is imminent, may be considered in connection with a differential diagnosis. While there is usually a history of long-standing gastric disturbance in ulcer, this is not invariably the rule. In acute perforation of an ulcer the location of the sudden violent pain, with marked tenderness and intense rigidity, is in the epigastrium, which would certainly not be affected in this manner in appendicitis, nor are the acute symptoms usually as severe in the latter condition. As regards the probable presence of a chronic ulcer which is giving trouble, a series of X-ray plates may prove of great value in not only confirming the diagnosis but in throwing considerable light on the general gastric and duodenal condition. Pancreatic trouble, whether acute or chronic, may be diagnosed from appendicitis by the prominent symptoms being practically limited to the epigastrium. Malignant disease of the cecum, tuberculous peritonitis, and extrauterine pregnancy might all be confused with appendicitis, but the fact that they are much rarer than appendicitis would only call for consideration in unusual and special cases where a careful history would alone serve to clear up the condition. In perinephritic abscess the character of the fever, the location of the pain in the loin, the X-ray plates, and palpation would all bring out unmistakable points of differentiation.

Membranous colitis, with the production of bands and veils, has already been alluded to. In long-standing and aggravated cases the diagnosis may be considerably obscured and may require exploratory incision to confirm their presence. Here the X-ray plate has been of great value, but it is not infrequent to find the appendix involved in the general chronic intestinal trouble incident to the stasis produced by these bands and veils.

Pneumonia and pleurisy, involving the base of the right lung, may be mistaken for appendicitis. In right-sided pneumonia there may

be considerable pain referred to the right iliac region by reason of an irritation of the lower intercostal nerves, which also supply the abdominal wall. There may even be superficial tenderness and rigidity, but deep pressure over the appendix in pneumonia would elicit no extra pain. Pneumonia usually starts off with a chill and the temperature mounts rapidly and is high, all of which is not characteristic of appendicitis. There may be no early physical signs in pneumonia, but whereas a deep inspiration may cause increased right iliac pain, the same procedure would also bring out and intensify the pain of parietal or diaphragmatic pleurisy, which would at once center attention on the chest. Young children are especially apt to exhibit abdominal symptoms in pneumonia.

OPERATIVE MEASURES.

The method of interference will necessarily depend upon whether the case is seen immediately after the onset of the attack or after the symptoms have been present for some time. It would also depend upon whether the local and general symptoms indicated supuration, extensive adhesions, the possible presence of a Lane's band or a Jackson's membrane. The consensus of opinion at the present time is that surgical treatment should be undertaken at the earliest possible moment after the onset of the attack, whether it be an early acute manifestation or a chronic exacerbation, rather than postpone operation with the hope that the inflammation may subside and resolution take place. The chief arguments against waiting are that it is always impossible to tell whether the attack will gradually subside or not; that the condition of the appendix may be much more serious than the local or general symptoms indicate, and that, even in cases which at first appear to be progressing favorably, serious complications may develop after some days and demand immediate operation when the conditions are much less favorable.

Experience has shown that it is not safe to rely entirely upon the local signs and the symptoms generally in determining the appendiceal pathology. The symptoms upon which dependence has been placed are the temperature and the frequency of the pulse, the intensity of the localized pain, tenderness and rigidity, and the general aspect of the patient. It can not be said, however, that these symptoms, either singly or collectively, afford the surgeon a true index of the pathological changes in and around the appendix. It has been found that even in pronounced disease of the appendix, especially when buried behind the colon, there may be but little pain and tenderness in the right iliac fossa, and the muscular rigidity, which is a sign of great value, may be slight, although the underlying pathological changes are well marked. The pulse rate is regarded as a

valuable sign, more especially when it shows a steady rise in conjunction with increasing tenderness and rigidity in the right iliac fossa. Probably the most valuable single sign in connection with forming an opinion of the condition of the appendix is the degree of leukocytosis with an estimation of the percentage of polymorphonuclears present. But even this is not infallible, as the general resistance and previous treatment would have a marked influence on the blood count.

The strongest argument in favor of an early operation is the greater ease and freedom from risk with which the diseased appendix may be removed in the first few hours after the onset of symptoms. The risk attending an early operation is very slight, and in fulminating cases an immediate operation is demanded as a life-saving measure. There is a difference of opinion as to the correct procedure to adopt when the patient is not seen until three or four days have elapsed since the onset of symptoms and the case seems to be progressing favorably. There is no doubt that many of these cases would do very well if treated expectantly, but in a certain proportion a satisfactory convalescence may not take place, and instead of complete subsidence an abscess may form, a perforation may occur, or gangrene may develop, any of which would call for an immediate operation. In view of these latter complications which are known to occur and which decidedly increase the mortality, it is the practice of many experienced surgeons to operate, as a rule, without delay, as it is considered that the operation, when carefully performed in advantageous surroundings, offers much less risk than the nonoperative measures.

The appendix, as a rule, should be approached by the most direct route, the location of the diseased organ being indicated by the point of greatest tenderness. The usual site of the appendix, McBurney's point, is on a line connecting the umbilicus with the anterior superior iliac spine and about 2 inches internal to the latter. It must not be forgotten that the appendix may be drawn by adhesions toward the midline, or if there is enteroptosis, it may be situated in the pelvis, and may even be present in the sac of an inguinal, femoral, or umbilical hernia. The base of the appendix is usually on the postero-internal aspect of the cecum and can be reached by following down the anterior longitudinal band of the latter, which leads directly to the appendix. In case of abscess formation it is of great importance to determine whether or not the abscess wall is adherent to the anterior abdominal wall. In case it is not adherent the general peritoneal cavity will have to be opened in the course of an operation directed toward the evacuation of the pus. If, however, the mass is adherent to the anterior abdominal wall, the pus may be reached without opening into the general

peritoneal cavity. These latter conditions are taken up in connection with the operative treatment of the two conditions.

In planning an operation for the first attack of appendicitis, where there is every reason to believe that the appendiceal pathology is of an uncomplicated character, the McBurney or muscle splitting incision is a valuable procedure, as it does not cut across muscles or fascia, and there is consequently less danger of subsequent hernial development. The McBurney opening may be enlarged toward the midline, should it be thought necessary, by a straight or oblique incision across the anterior and posterior layer of the sheath of the rectus muscle, retracting the latter internally as the posterior incision is completed. By this latter procedure a very satisfactory exposure of the contents of the right iliac fossa can be had, and there are a number of surgeons who prefer this method of intervention, claiming that by its use all necessary surgical work can be accomplished in this region.

On the other hand, when there is a palpable mass or an abscess in this region, or when there is reason to suspect the presence of adhesions, bands, or false membranes, the Battle incision is preferred by many. This incision not only affords an excellent view of all the structures involved, but it may be readily enlarged in an upward or downward direction to suit an individual case, while drainage in different directions may also be easily accomplished. In case of doubtful diagnosis, where structures in the epigastrium may be involved, such as the gall-bladder or a Jackson's membrane, then the Battle incision is to be preferred, as it lends itself much more readily to enlargement both above and below than the muscle-splitting incision. It is maintained by many that the Battle incision is practically always preferable, for by reason of the thorough exposure there is less liability to overlook kinks or membranous bands and it is easier to remove the same when present.

The McBurney muscle-splitting abdominal incision is accomplished as follows: A point is selected about 2 inches internal to the anterior iliac spine and on a line passing from the latter to the umbilicus. This point, already alluded to as McBurney's point, is made the center of a 3 to 4 inch oblique incision downward and inward through the skin, fat, and superficial fascia until the aponeurosis of the external oblique muscle is reached, the fibers of which aponeurosis parallel the oblique incision in the skin. Having exposed the external oblique aponeurosis, it is now divided in the direction of its fibers to the full extent of the skin incision and its edges retracted. This exposes the fibers of the internal oblique muscle which runs upward and inward from the outer half of Poupart's ligament and the iliac crest toward the umbilicus. A small transverse incision is now made in the aponeurotic portion of the internal

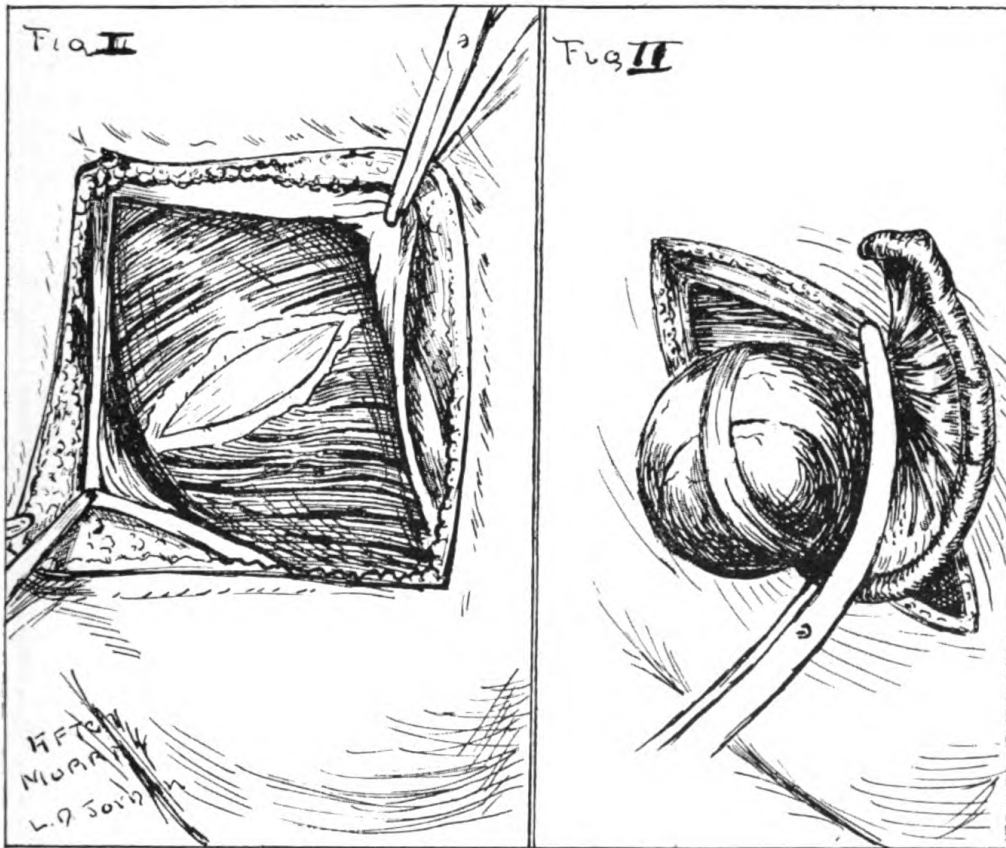


PLATE I.

Fig. 1.—McBurney's muscle-splitting incision.

Fig. 2.—Appendix and cecum delivered through muscle-splitting incision.

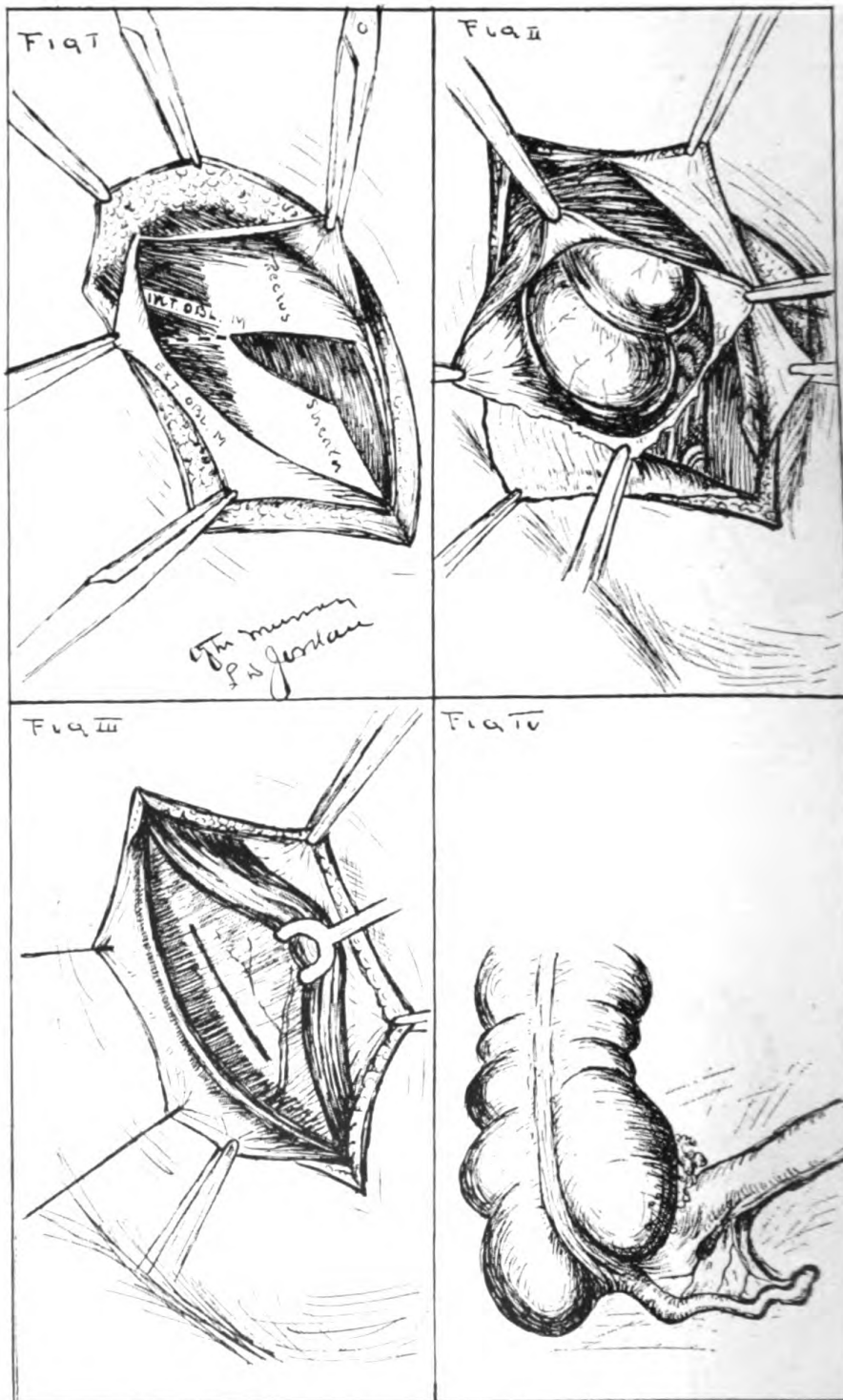


PLATE II.

- Fig. 1.—Method of extending muscle-splitting incision.
 Fig. 2.—Muscle-splitting incision extended, internal oblique and transversalis muscles having been divided.
 Fig. 3.—Battle's rectus incision.
 Fig. 4.—Normal appendix and cecum.

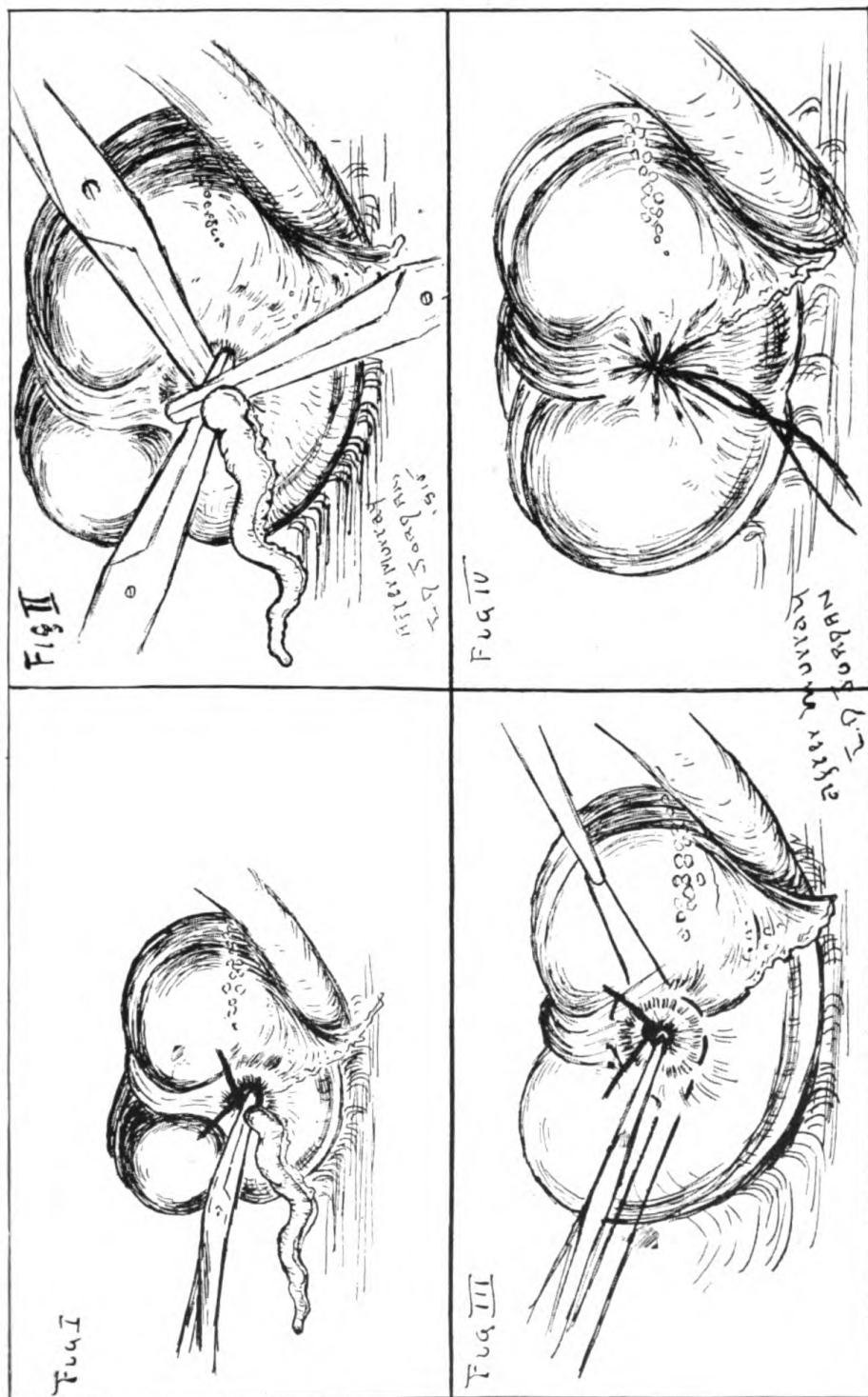


Fig. 1.—Ligation of appendix after removal of meso-appendix.
 Fig. 2.—Method of applying three hemostats, the middle one to be removed and the appendix cut across between two remaining hemostats after ligation.
 Fig. 3.—Burying stump of appendix with purse-string suture.
 Fig. 4.—Purse-string suture complete.

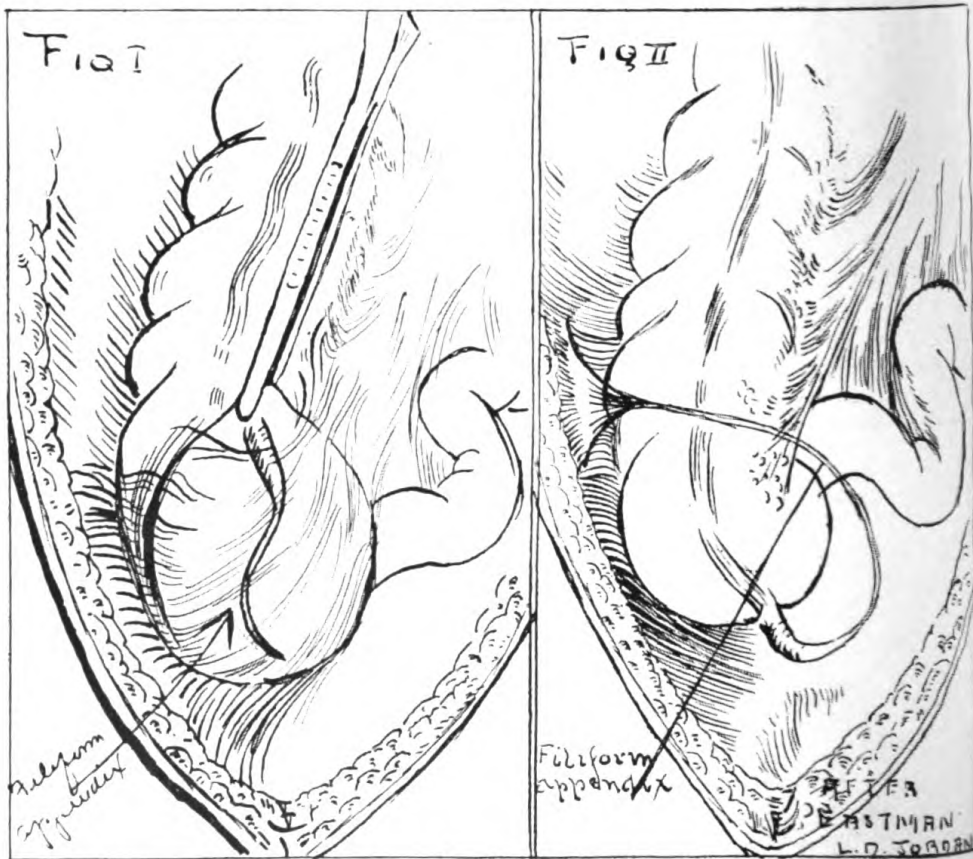


PLATE IV.

Figs. 1 and 2.—Illustrating types of filiform appendices and Jackson's membrane (Fig. 1).

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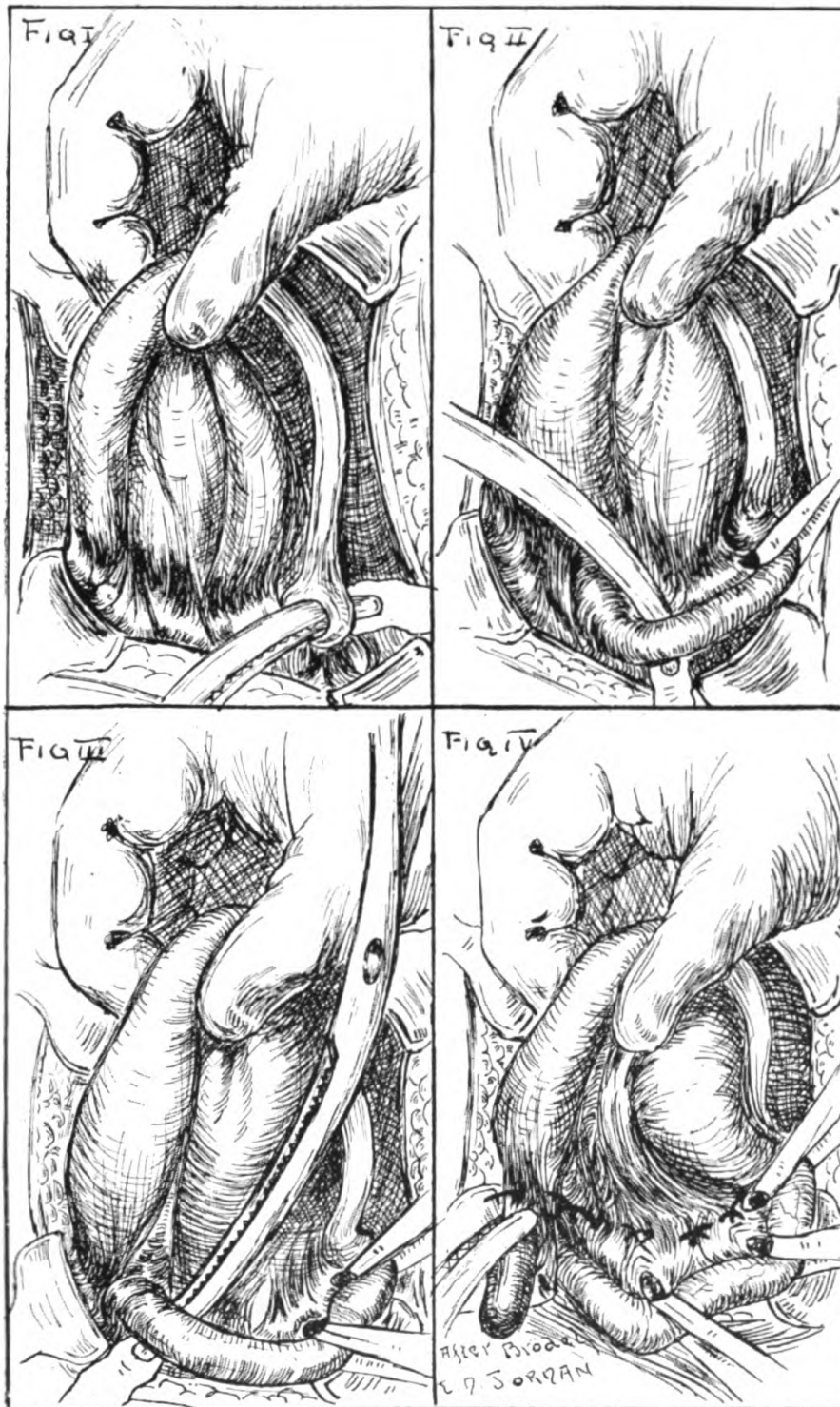


PLATE V.

Series illustrating a method of dealing with a retrocecal appendix.

- Fig. 1.—Pushing a blunt Kelly forceps through meso-appendix at cecum.
 Fig. 2.—Traction on base of appendix, bringing more of appendix into view.
 Fig. 3.—Traction on second loop of tape, exposing appendix near tip.
 Fig. 4.—Meso-appendix clamped on cecal side and cut as indicated.

oblique, and with the handle of the scalpel the fibers of the internal oblique and underlying transversalis muscle are bluntly separated along the line extending from the iliac spine to the umbilicus. The transversalis fascia, which overlies the peritoneum, is now picked up with forceps and a small incision is made until the peritoneum comes into view. When this is accomplished the peritoneum is picked up and divided between two forceps, care being taken to lift the peritoneum up so as to avoid injury to the intestine. After a small opening has been made in the peritoneum, the surgeon's finger is introduced as a guide to the scissors and to protect the intestine or omentum from injury while the division of the peritoneum is completed. The opening in the peritoneum should be from $1\frac{1}{2}$ to 2 inches in length or sufficient to insert a small abdominal retractor, which latter can be made to lift the abdominal wall upward and inward and thus greatly facilitate the delivery of the appendix. At this juncture moist warm abdominal pads are introduced a short distance into the peritoneal cavity and around the margins of the wound in such a manner as to protect the intestines from coming in contact with the skin.

The Battle incision is accomplished as follows: A vertical incision is made 1 inch internal to and parallel to the outer border of the right rectus muscle. The incision commences about 1 inch below the level of the umbilicus and is carried down for a distance of 3 or 4 inches through the skin and superficial fascia. The anterior layer of the right rectus sheath is now divided vertically about half an inch from the outer margin of the muscle, the incision being from 2 to 3 inches long, and its edges are retracted, thus exposing the muscle. The latter is loosened from the sheath and pulled strongly inward by a broad retractor. The transversalis fascia and the lower portion of the right rectus sheath are next divided vertically in line with and for the same distance as the incision in the anterior layer. This exposes the peritoneum, which is picked up between two forceps and divided as indicated in the McBurney incision. The deep epigastric vessels will be encountered, and may be either retracted inward or ligated and divided. Several lower intercostal nerves may also come into view and are to be preserved if possible. This incision is closed by three rows of sutures. The first row is a continuous suture of chromic gut, including the peritoneum, transversalis fascia, and the divided portion of the posterior layer of the right rectus sheath. The second row is an interrupted suture of chromic gut bringing together the anterior layer of the rectus sheath. The skin wound is closed by either a continuous or interrupted suture or by Michel's metallic clips. It is considered important that the second row of sutures bringing together the anterior layer of the rectus sheath should be interrupted and *not* continuous, as practiced

by some surgeons, for the reason that if a continuous suture is used and it happens to be weak at any point it may break before firm union of the anterior layer has taken place and cause a hernial protrusion. The interrupted suture in this situation insures at least one row of deep sutures which can be depended upon to hold the sheath together until firm union has taken place.

The McBurney incision is closed by first bringing the opening in the peritoneum together with a continuous suture of plain or chromic gut. This is followed by two or three interrupted sutures to bring together snugly, but not tightly, the split fibers of the internal oblique and transversalis muscles. A continuous chromic gut suture now unites the edges of the divided aponeurosis of the external oblique, and the skin incision is closed, as in the Battle incision, with an interrupted or continuous suture, or with Michel's clips. In the McBurney incision the different layers of the abdominal wall are divided in different directions, and there is not the tendency to a hernial protrusion, as would be in the Battle incision if the anterior layer of the rectus sheath separated on account of a defective continuous suture. Hence there is not the necessity for closing the fascia in the McBurney incision with interrupted sutures to insure the integrity of the abdominal wall. The method of closing the abdominal wall when drainage is necessary will be mentioned later on in discussing the technic of pus cases.

Having opened the abdomen through whatever incision has seemed desirable, the surgeon's next step is to locate the cecum. This is done by introducing the index finger and causing it to sweep over the floor of the iliac fossa until it encounters the mesentery of the ileum. The ileum, being thus defined, can be followed to the cecum and the latter hooked up into the wound at the ileo-cecal junction. It may happen that the cecum bulges into the wound from the start, and it may only be necessary to pick it up with the aid of a piece of moist gauze. The cecum is identified by the anterior longitudinal band and the latter leads directly to the base of the appendix. The cecum should now be gently withdrawn outside the abdomen and the appendix, with attached meso-appendix, brought up into the opening.

The principal artery supplying the appendix is derived from the ileo-cecal branch of the superior mesenteric artery and runs through the meso-appendix close to the free border. Another smaller artery is directed to the angle between the base of the appendix and the cecum. The meso-appendix may be ligated in sections and divided, or one silk ligature, introduced close to the cecum, may include the entire meso-appendix. The latter, when perfectly free, may be clamped with a Kelly hemostat up to the base of the appendix and then divided, ligation being done later.

Having thus isolated the appendix, ligated and divided its mesenteric attachment, attention is directed toward amputation. This latter is accomplished by first introducing a seromuscular purse-string suture in the cecum about half an inch from the appendix, left in position until the stump of the appendix is ready to be buried. After the introduction of the circular purse-string suture, a hemostat is used to crush the appendix about a quarter of an inch from the cecum and a ligature of silk or chromic gut surrounds the appendix between the cecum and the hemostat. The latter, after the ligature is tied, is shifted about a quarter of an inch along the appendix and again clamped to prevent escape of appendiceal contents when the organ is removed. The crushed portion of the appendix, between the ligature and hemostat, is now cut through with scissors, scalpel, or thermocautery. Just before cutting through the appendix a few layers of gauze are placed so as to protect entirely the cecum and small intestine near the appendix from possible contamination or injury, and at the same time the cecum is steadied and held up into the wound by an assistant. The scalpel or scissors used to amputate the appendix should be laid to one side and not used again, because of contamination by the appendiceal mucous membrane and contents when the instrument cuts through the appendix. Having removed the appendix, the mucous membrane of the stump is cauterized with pure carbolic acid on an applicator, and alcohol is then used in the same way to neutralize the excess acid. An assistant now grasps the stump with thumb forceps while the operator removes the gauze pads over the cecum and picks up the ends of the purse-string suture. The stump is next pressed into the wall of the cecum while the purse-string suture is drawn and tied, thus burying the stump in the wall of the cecum. This latter procedure is facilitated if the assistant picks up the purse-string suture with thumb forceps at a point opposite the tying ends and holds the suture out from the cecal wall until the stump has been well pressed in. Some surgeons bury the stump with a Gould stitch or a row of Lembert sutures, and some have advocated simple ligation and cauterization without burying. This latter procedure is regarded as unsafe by the great majority of surgeons, as, unless the stump is buried, gaseous distention may cause the ligature to slip off and fecal matter may escape into the abdomen. Invaginating the stump without previous ligation is no longer practiced, since a number of cases of fatal hemorrhage have been reported as a result.

The delivery of the appendix may be a difficult proceeding on account of inflammatory changes resulting in adhesions, short mesenteric attachment, or the presence of bands binding it in different situations in the abdominal cavity. The cecum, too, may be held down by bands or membranous veils, which thus prevent sufficient mobility.

When there is any serious difficulty in bringing the appendix up and out of the wound the latter should be enlarged so as to admit of thorough exploration of the iliac fossa and the prompt control of any hemorrhage which might occur as the result of separating dense adhesions or bands. The Trendelenburg position will greatly aid in keeping coils of intestine away from the operative area and thus give more room for intra-abdominal work and manipulation.

When the appendix occupies a position behind the ascending colon it will be necessary to divide the peritoneum on the outer side of the cecum or colon, so that the latter can be displaced inward, thoroughly mobilized, and its posterior surface exposed. In this situation the appendix is usually adherent to the posterior aspect of the colon and it becomes necessary to remove it from its bed of adhesions by careful blunt dissection. When this has been accomplished the base of the appendix is crushed, ligated, amputated, and cauterized as already indicated. Should the posterior wall of the cecum be congested and edematous, as is usually the case in the type under consideration, it would not be wise to try to bury the stump, as the suture material will not hold in the softened friable wall.

In a certain type of cases there may be a short meso-appendix or the tip of the appendix is held down by adhesions and its complete delivery thus prevented. When this occurs the base of the appendix may be crushed, ligated, and divided, care being taken to prevent peritoneal contamination. This is followed by ligation of the meso-appendix and ultimate separation of the adhesions. This latter is greatly facilitated by gently pressing against the adhesions with a gauze pad. In many instances where adhesions are encountered and the cecum seems anchored, a good deal can be accomplished by gentle traction on the head of cecum, pulling it forward into the wound and gently stretching the bands of adhesions in the neighborhood until they can be ligated and divided. In cases where the appendix is gangrenous or markedly congested, softened, or friable, it is to be handled very gently, with as little traction as possible, merely surrounding the base with a catgut ligature and cutting the appendix away.

When Lane's bands are encountered they are to be thoroughly exposed by retracting widely the margins of the abdominal wound, enlarging the latter to suit the condition present, and then dividing the bands between silk ligatures. The membranous veil of Jackson, when it involves the cecum and lower part of the ascending colon, can not infrequently be peeled off from the anterior and outer aspect of the colon by gently wiping with moist gauze and then the redundant portion removed with scissors. Care, however, is to be exercised in avoiding, as far as possible, injury to the delicate peri-

toneal surfaces of adjacent intestine, and this holds good for all abdominal work in order to prevent fibrous adhesion subsequently forming when the peritoneum has been wounded. In case the membranous veil involves the transverse colon, binding the latter to the ascending colon and causing a marked kink at the hepatic flexure, it can be divided with scissors from below upward and any redundant membrane removed.

Localized suppurative appendicitis is to be diagnosed usually by the presence of a mass in the right iliac region and by the symptoms already enumerated for this condition. There are two methods of attack, dependent upon whether or not the iliac tumor or mass is adherent to the anterior abdominal wall. Although it may be apparent in certain cases that the tumor is adherent to the abdominal wall, this fact can not be definitely ascertained until the peritoneum has been divided. The incision may be made directly over the mass, cutting through the muscular walls until the peritoneum is reached. This, however, is not advisable unless the abscess is apparently pointing at the spot selected for incising the abdominal wall. Granting that the appendix is in the usual situation, the abscess or mass may be approached by a McBurney muscle-splitting incision, with a view to subsequent enlargement, or by a Battle incision. In these cases of adherent abscess, as soon as the peritoneum is opened, there is a flow of foul-smelling pus, and the latter is mopped up as it drains from the abscess cavity. As soon as the flow has apparently ceased the opening in the peritoneum is cautiously enlarged to admit an exploring finger, care being taken not to disturb the adhesions which are walling off the abscess from the remainder of the peritoneal cavity. With a finger in the abscess opening, the surgeon ascertains the direction of the pus cavity and any diverticula that may be present. The appendix may be felt as a hard lump or cord situated in the depth of the wound. The margins of the wound are now gently retracted and the abscess cavity mopped free of pus by tamponing with strips of gauze until, by seeing and feeling, an estimate can be formed of the appendicular pathology. The appendix may be gangrenous throughout or in part, and the gentlest procedures are necessary in endeavoring to mobilize the diseased organ. This latter can be accomplished in the vast majority of cases by patient and gentle manipulations, the surgeon's finger beginning at the tip of the appendix and gently working toward the base. In this manner the adherent organ is liberated and can now be ligatured with catgut and divided. Sometimes the appendix has sloughed off and lies free in the abscess cavity, in which case it is to be removed with forceps and no effort made to close the stump opening unless it be easily accessible. A fecal fistula usually forms under

such circumstances, but is not to be dreaded, as it usually closes spontaneously. In other instances the bulbous appendix may be devoid of mesenteric attachment and adherent to the cecal wall, surrounded in part by plastic exudate, with one or more gangrenous perforated spots near which a small fecalith is usually present. This variety is handled in practically the same way as when the appendix is adherent to the posterior cecal wall.

In case pus is not encountered when the peritoneum is opened it will be necessary, before attacking the mass or abscess, to arrange moist gauze pads in the abdomen in such a manner as to completely wall off from the general peritoneal cavity the pus which will escape when the mass or abscess is manipulated or opened. This latter is accomplished by passing the index finger gently down between the mass and the outer abdominal wall, separating adhesions, until pus is reached. The abscess cavity is now mopped out as indicated above and the mass gently liberated until the appendix is recognized. In these types of cases the appendix is friable and, unless care is exercised, is liable to break off. When completely mobilized it should be ligated, amputated, and the stump cauterized, but no attempt should be made to bury the stump on account of the edematous condition of the wall of the cecum.

In draining the peritoneal cavity after suppurative appendicitis the surgeon is guided by the location and extent of the purulent material. In cases where there is only a small collection of walled-off pus the cavity may be drained for several days or until the discharge stops, with a cigarette drain made of rubber tissue rolled and secured over a wick of gauze. The abdominal wound in these cases is closed in layers up to the cigarette drain, leaving a liberal opening for the drain, which latter should be long enough to protrude outside the abdominal wall for 2 or 3 inches. In case the collection of pus has spread in several directions, such as upward under the colon or downward toward the pelvis, a cigarette drain is carried to the depth of each prolongation of the abscess cavity. When the pus cavity is extensive and the purulent discharge profuse it would be wise also to establish posterior drainage through a stab wound in the loin, above the iliac crest, in addition to the anterior drainage. Sometimes when the pus cavity is located behind the colon and is not extensive, efficient drainage can be obtained through a posterior stab wound alone, the anterior wound in the abdominal wall being closed in the usual way.

The posterior stab wound is made by passing a closed hemostat into the anterior abdominal wound, pressing it firmly backward against the posterior abdominal wall until it can be felt to bulge above the crest of the ilium. At this point a small wound is made

with a scalpel from without inward until the hemostat is reached. The latter is now made to pass entirely through the loin wound and its blades are opened so as to enlarge the wound sufficiently to admit of drawing the drain through the opening and into the abdominal cavity. When only posterior drainage is used and the anterior wound closed entirely the danger of developing a subsequent ventral hernia is much less than would be the case where it would also be necessary to maintain anterior drainage. Some surgeons prefer to use a form of cigarette drain made by splitting a rubber drainage tube and placing a wick of gauze in the lumen so that it protrudes slightly from each end of the tube. The objection to rubber tubing is that it may press against the intestine and cause sloughing, with the subsequent formation of a fecal fistula.

All drains are to be removed as early as practicable. Usually on the second day they may be pulled out an inch or more and shortened, so that in four or five days they usually may be removed entirely. The wound is to be dressed as often as may be necessary to remove the soaked inner dressings. When the discharge is profuse it may be necessary to change the dressings morning and evening until it lessens, and after the second day it may be practicable to shorten the drains on each succeeding day when the wound is dressed. After the drains have been removed it may be advisable to merely keep the skin wound open with a small wick of gauze or rubber tissue so as to prevent a superficial collection of pus. In case more than one drain is used the less efficient drains are to be removed first until probably only one drain is left to drain whatever part of the pus cavity is discharging.

In the borderland cases the question of when and when not to drain is largely a matter of surgical judgment. When in doubt a safe rule to follow would be to introduce a cigarette drain for a short while until it is evident that there is no discharge or collection of fluid that ought to come away. Of course, drainage is instituted in all cases where not only is pus present or the appendix frankly gangrenous, but also where there has been any actual or suspected soiling of the peritoneum, which might result in a localized peritonitis. As already indicated, infection may travel through the necrotic or devitalized wall of the appendix. In this group of cases, as soon as the peritoneum is opened, there would be a distinct colonic odor, the peritoneal fluid would have a yellowish tinge and, when closely examined, would be found to be highly cellular and very probably contain small flaky particles of fibrous exudate. In this condition the appendix may be found to be practically free in the abdominal cavity and partially or completely covered by a fibrous exudate which might or might not cover over a perforation. After

the removal of these appendices it is obvious that drainage—one large cigarette drain—is necessary on account of the apparent infection that has reached the peritoneal cavity either through a perforation which may be covered over with fibrous exudate or through the devitalized wall of the appendix. These cases usually do well, as there is evidence of reaction on the part of the peritoneum: but there is a certain group of cases in which the appendix is gangrenous or perforated and in which there is but scant evidence of any fibrous exudate on the appendix or any walling off of an obvious infection. Here the peritoneal fluid, in addition to the colonic odor, would very probably be thin and mud colored. In these grave cases the lack of reaction on the part of the peritoneum is due either to a high virulency of the infective organisms or to a very low resisting power of the patient, resulting in a quickly spreading general peritonitis and an overwhelming septicemia. In these cases the operation should be performed as expeditiously as possible as the patient is already profoundly depressed. The appendix is rapidly ligated, amputated, and cauterized, and several large cigarette drains placed so as to promote the flow of septic peritoneal fluid through the large abdominal opening. The latter is partially closed by only a few stitches to prevent the abdominal contents from escaping.

The practice of flushing the abdomen with warm salt solution is no longer advocated, as it may carry infection to remote areas of the peritoneum still intact. Aspirating the peritoneal fluid with a suitable apparatus is practiced by some surgeons, but the majority depend on removing the fluid and exudate by gently mopping with gauze pads in different directions and followed by free drainage as already indicated. In mopping the peritoneal surfaces great care must be exercised not to injure the delicate endothelial covering, as such injury would not only promote septic absorption but also the formation of permanent fibrous adhesions.

In all cases of suppurative appendicitis, and whenever drainage has been instituted, it is advisable to place the patient in Fowler's position, as it is not only favorable for drainage, but tends to promote gravitation of the fluid exudate to the lower abdominal and pelvic regions, where absorption takes place more slowly than in the upper or subdiaphragmatic region.

The subsequent treatment is mainly directed toward supporting and conserving the patient's strength. As soon as the patient has been placed in Fowler's position slow proctoclysis, by the Murphy drop method, is begun. There are several excellent apparatus on the market to insure the correct administration by this method. When there is considerable shock it is advisable to add adrenalin chlorid (1 teaspoonful of a 1:1000 adrenalin chlorid solution to 1 quart of saline solution). Nothing is allowed by mouth during the period

of proctoclysis, so as not to excite peristalsis, and for the first few hours the thirst and restlessness are controlled by small doses of morphin. This line of treatment is maintained until it is felt certain that protective adhesions have walled off all danger of spreading peritoneal infection, and in the graver cases until there is a decided reaction from the depressed state. Usually in 24 to 48 hours the proctoclysis may be discontinued and the patient placed in a semirecumbent position in bed and allowed to rest in this manner until convalescence is assured. Large quantities of saline solution may be successfully introduced by the Murphy method, sometimes amounting to 4 or 5 quarts in 24 hours. At times it is not borne well, and it is then necessary to introduce it at four or six hour intervals. Thirst is usually complained of during the first few hours, but after a variable period the absorption of the saline solution causes this to disappear.

In the so-called "clean cases" liquid food may be allowed by mouth in from 36 to 48 hours, and followed in three or four days, in the usual run of cases, by an easily digested soft diet. After recovery from the anesthetic in these cases small sips of water may be allowed at intervals during the first 24 hours to allay the parched condition of the mouth. The practice of introducing into the rectum several quarts of tap water, with glucose and bicarbonate of soda in solution (1 ounce of each to a quart of water), is an excellent procedure and helps considerably to tide over the period of depression and distress incident to operation. In pus cases and in graver septic cases it would be wise to withhold all solid food until the integrity of the intestinal canal is assured and the complete walling off of any infective process has taken place, and also until convalescence is well established.

Postoperative paralytic ileus, which may be associated with vomiting of a distressing type, is sometimes met with and is a very grave complication. Lavage of the stomach has given a certain amount of relief, but its repetition may accentuate the distress. The return of peristalsis may be encouraged by medicated (turpentine) enemata, and by the subcutaneous or intravenous injection of 1 c. c. of pituitary extract. Hypodermic injections of eserine sulphate (grain $\frac{1}{30}$), repeated every two hours for four doses, has not infrequently caused the distention to subside and is of especial value in the early stages or in anticipating a paralytic condition of the intestinal wall. Sometimes it may be necessary to reopen the wound and incise the cecum, permitting the escape of gas and fecal matter. When great distention is encountered on first opening the abdomen, in the grave septic cases, it is advisable to withdraw a distended coil of intestine, make a small incision and pass into the lumen a large glass tube for some distance. This will not only relieve distention, but is highly spoken

of as a means of draining off altered intestinal contents, which would otherwise accentuate the septic condition. The intestinal wound may be closed afterwards in the usual manner, or, in very grave cases, a temporary artificial anus may be formed.

Opinions differ as to whether or not the appendix should always be removed in addition to evacuating the circumscribed abscess. It is a question of surgical judgment in some cases as to whether the appendix can be removed without the manipulations causing too much separation of protecting adhesions, or so prolonging the operation that the risk to the patient's life would be increased. When the abscess is merely opened and drained it is to be expected that symptoms will recur in about 20 per cent of the cases and necessitate a subsequent operation for removal of the appendix. Again, when the appendix is not removed, a persistent sinus and troublesome discharge will develop in a certain percentage of cases. The chief danger attending the removal of the appendix in abscess cases is that infection may be carried to other parts of the peritoneal cavity by unduly separating the protective adhesions which surround the abscess cavity. The modern practice of protecting the abdominal cavity and contents by packing off the abscess cavity with gauze, together with liberal drainage, is regarded by many as sufficient to always warrant the removal of the appendix if the patient is not already profoundly shocked and if a prolongation of the operation will not jeopardize the life of the patient.

FUNCTIONAL TESTING OF THE EAR.

By G. B. TRIBLE, Passed Assistant Surgeon, United States Navy.

For the purpose of accurate comparison the methods of testing the ear should be uniform in character, and due weight should be given to each test separately and to the results as a whole. In case of wide divergence in the results obtained the reasons should be carefully sought. There may be ignorance of the end required, plain stupidity or malingering on the part of the patient, or a lack of care on the part of the examiner.

The otoscopic examination should always precede the functional testing and should be combined with a thorough examination of the nose, nasopharynx, and pharynx. The patency of eustachian tubes should be tested by inflation; this should follow the functional testing, and any difference in the hearing power should be noted. The configuration of the external ear, the external auditory canal, and the drum should be given attention. Then the mobility of the drum

and the pliability of the ossicles should be tested by Siegle's otoscope. This should follow the functional tests.

HISTORY.—The history, while ordinarily of service, can not be depended upon for direct evidence. The possibility of deceit for selfish reasons always exists, much more so than in civil practice, hospital, or dispensary work. For this reason direct questioning as to whether or not there has been any previous ear trouble can not be relied upon so strongly, but indirect questions regarding the various infectious diseases likely to have ear trouble as complications or sequelæ, or whether there have been repeated colds and sore throats, can usually elicit considerable information of value. Heredity plays an important part. Frequently there will be deafness in families, usually coming on about the same age in the various members. It is important to know the previous occupations pursued. Occupations associated with sudden changes of temperatures, such as coachmen, sailors, fishermen, masons, all tend to reduce the hearing power indirectly through liability to chronic inflammation of respiratory mucous membrane. Those subjected to noises, locksmiths, blacksmiths, boilermakers, and iron workers in general often hear poorly. This has been explained by Politzer as being due to excessive irritation of the auditory nerve. Subjective noises are often in these cases a later symptom. Anatomically there are structural changes in the labyrinth, while, of course, there may be also disease of the middle ear or auditory nerve.

The disturbances of hearing following heavy gunfire are caused by sudden condensation and rarefaction of air in the external auditory canal or by the intense noises. From the condensation there may be rupture of the drum, hemorrhage into the middle or external ear, and even paralysis of the endings of the auditory nerve. In the case of men already in the service there is possibly too great tendency to place the blame for all ear diseases upon target practice; mere rupture of the drum heals very readily unless there is some infective agent present in sufficient quantity and virulence to overcome the natural resistance. The presence of tonsillitis or any of the infective inflammations of the nose and throat will supply the other factors. It is often found upon finally getting the history and upon examination that there have been previous attacks of middle-ear suppuration or there exists a marked tonsillitis or rhinitis. Scarred and thickened drums from previous disease are naturally more susceptible to the effects of gunfire.

TESTS.—The most common tests of the hearing and ones which can always be carried out are the voice tests—the spoken or conversational voice and the whispered voice. These are very important, for the usefulness of the individual is measured by his power of hearing and understanding spoken words. Speech covers a great many tones.

According to Wolf, of Frankfort on the Main, speech has a compass of eight octaves, from C_2 to C^5 ; the lowest tone, R. lingual, has 32 vibrations per second, and the highest, S., has from 5,400 to 10,840 vibrations per second. It will be called to mind that the human ear normally can perceive from the lowest, 16, to about 40,000 double vibrations. The sensation produced by the extremely high notes is not pleasurable. The piano has seven octaves from the lowest C, with 32 vibrations per second, to the highest C^4 , with 4,096 vibrations. Vowels are perceptible at a greater distance than consonants, due to the strength of their tones and the amplitude of their vibrations, while words with A, E, or I are heard at a greater distance than those with O or U. There is no positive relation between the hearing power for the whispered voice and the speaking voice, so that the test of the one does not always indicate perception of the other. High-pitched and far-reaching sounds, spoken in conversational tones, contained in such words as *message*, *schistose*, *sage*, *sex*, *sixty-six*, are heard above 100 meters spoken with the conversational tone, while the high weak F sounds, such as *faded*, *Frankfort*, *Frederick*, *Ferdinand*, are only heard about 50 meters. A minimum of 50 feet under good conditions, the patient standing, eyes closed, one ear sealed, and the ear to be tested turned toward the examiner, should be insisted upon. A minimum of 30 feet is given in the instructions for medical officers. Roughly, it may be said if the surgeon turns his back to the person tested the distance may be considered increased one-third, and if the patient turns his open ear to the wall the distance is approximately increased another third.

Whispered voice.—This is one of the most useful and practical tests and should be made with the patient sitting quietly, eyes covered, the tip of a moistened finger placed in the ear not undergoing the test. The ear to be tested should be toward the examiner, whose position should be away from and a little forward of the patient. The test should be made with the residual air, after a moderately forceful expiration. This minimizes the difference due to different intensity. Use of numbers ranging from 1 to 100 and the use of short sentences are sufficient. The normal hearing power for whispered voice is about 20 meters in a quiet room. The minimum requirement in the Navy is 15 feet. In these tests, as in the others, for reasons to be explained later, the testing should commence at the maximum distance, just at the border or beyond the limits of perception, and gradually approach the one to be examined. Under poor conditions such as winds, lack of quiet, or open-air tests, from 7 to 10 feet is normal for whispered voice.

Acoumeter.—This instrument was devised by Adam Politzer and is so constructed as to produce sounds of uniform intensity. The tone corresponds to C and has between 400 and 468 double vibrations

In testing both by the watch and the acoumeter the following points should be observed. The acuteness of hearing may vary, dependent upon several conditions—the temperature, the humidity, and the somatic and psychical condition of the one tested. Again, the tests should be uniformly carried out by approximation to the ear from without the boundary of perception. If the tests are carried out by commencing well within the range of perception and going away, there will be found a larger and inconstant measurement. This fact is explained by Politzer by the supposition that the nerve terminals are at rest and require greater stimulus to disturb their equilibrium. When the sound is withdrawn from the ear the auditory nerve, being in a state of excitement, is kept in this condition by vibrations of less intensity. The hearing distance for the acoumeter is given by Politzer as 15 meters. For purpose of testing bone condition it is fitted with a small disk for contact. Practically a hearing distance of 40 feet is accepted for the acoumeter. It is difficult in practice to apply the spoken voice and the acoumeter tests because of the scarcity of room of sufficient size. Roughly, 40 feet is taken as the normal hearing for the acoumeter, so if it is heard only 20 feet the result would be indicated by the fraction 20/40.

Watch tests.—One of the chief arguments against the employment of the watch test is the great variability in the pitch and the intensity of the tick. The low-pitched tick of the cheaper watches, such as the Ingersoll dollar watch, should be heard, according to Ballenger, at 120 inches, while the ticking of the nonmagnetic Swiss watches of the highest pitch is only heard 60 inches. By standardizing the watch used this test can give great assistance, or, better, a watch of uniform pitch and intensity should be employed throughout the service. Experiments are being carried out with the sick-bay clocks along the line suggested by Surg. R. C. Holcomb, United States Navy. The requirements of 40 inches in the case of candidates for the Naval Academy, who are young and supposedly of good health, do not appear too rigid. The watch test affords great assistance in the chronic catarrhal middle-ear cases, with the stoppage of the eustachian tube, for when rarefaction of the air has taken place in the middle ear the watch is heard poorly or not at all by the air conduction, while when the tube is clear and the normal tension of the drum and ossicular chain exists from normal air pressure, the hearing is correspondingly good. This accounts for the great variation existing in hearing for the same watch during the course of treatment of these cases. It would seem that even with no existing middle-ear disease there is a reduction in hearing in the case of men exposed to constant metallic sounds, so that in the case of reenlistments a fall in the hearing power for the watch, if no apparent disease exists, should not be cause for rejection. In testing bone con-

duction by the watch, pressure should be made directly upon the mastoid. As noted above, the watch test should begin at the border or just beyond the border of normal perception and gradually approach until heard. It is a good practice to muffle the tick occasionally rather than use the stop watch. The click is heard louder than the usual tick, so that the candidate can tell whether or not he ought to hear it, because he can tell that it has been stopped or set going and answer accordingly. Before beginning the tests the watch should be applied to the ear, so that the tone can be ascertained. The tests before mentioned have been more or less of general adaptation and serve chiefly as means of testing the hearing power, without throwing much light on the diagnosis in case the hearing is impaired. On the other hand, the tuning-fork tests, the various pipes and whistles, serve as diagnostic measures, in addition to ascertaining the acuteness of hearing.

Galton's whistle.—This is included in the Edelman continuous-tone series, recommended by Bezold, which will be taken up later. The whistle, however, is used independently. Its chief use lies in testing the higher tones. According to Burkhardt-Merian, the whistle takes in more than the three upper octaves of the scale. The tones have from 6,480 to 84,000 simple vibrations per second. It is to be noted that there is physiological diminution for the perception of high tones in old age. One disadvantage in the use of the Galton whistle lies in the fact that it is almost impossible to exclude the sound ear in unilateral affections, so that the practical use of this instrument lies in testing bilateral affections with marked impairment of hearing. To understand completely the results obtained with the tuning forks, and in order that these results may not seem incongruous and bizarre, it is necessary to go briefly into the physics of sound and the physiology of air and bone conduction. Sound is given in physics as the peculiar sensation excited in the organ of hearing by the vibratory motion of bodies when this motion is transmitted to the ear, and thence to the brain, through an elastic medium. Mere molecular motion does not constitute sound, for molecules are always in motion. In order that sound may be produced the body must vibrate as a whole (Ganot).

Vibrations are understood differently. In America, England, and Germany a vibration comprises a motion to and fro, while in France a vibration is taken to mean a movement either to or fro. Sound can not be propagated *in vacuo*. Sound is transmitted in longitudinal waves at the rate of 1,100 or 1,200 feet per second, and the function of the sound-conducting apparatus of the ear is the transformation of the longitudinal sound waves of the air, or the longitudinal waves which pass directly into the skull, into transverse vibrations of the sound-conducting apparatus. As in the case of visual stimuli.

auditory sensations are projected to the supposed origin of the sound, but, owing to certain physiological and anatomical considerations, are not so accurate as visual impressions. For instance, in the case of a vibrating tuning fork held between the teeth, the vibrations being transmitted to the internal ear through the bones of the head, the sound is apparently perceived in the head and not projected to its origin. As above mentioned, sound travels in waves; it is transmitted through the air by longitudinal vibrations of the molecules of the air and is produced by the vibration of the sounding body.

Sound waves reach the labyrinth by two means—air conduction and bone conduction. By air conduction the waves are brought against tympanic membrane, setting up a vibration of the ossicular chain and being transmitted through the movable joint of the foot of the stapes into the oval window. Politzer has shown that the greatest excursions are performed by the malleus; the stapes performs the least; and the incus intermediate. By air conduction the sound waves may reach the labyrinth under some conditions through the round window and by bone conduction through the bones of the skull. The auditory nerve can not directly receive sound waves. When a vibrating body is brought into contact with the cranial bones the vibrations are transmitted all over the head, and may be brought directly by the bones to the labyrinth, or indirectly from the cranial bones to the membrana tympani and ossicles, and through these to the labyrinth. This latter method has been termed cranio-tympanic conduction.

Bezold is of the opinion that it is only by this method that sound waves can be perceived by the labyrinth. This is disputed by Politzer on the ground that bone conduction is better perceived when the membrana tympani and ossicles are destroyed. Complete testing of all the tones perceptible by the human ear can only be carried out satisfactorily by the continuous-tone series, recommended by Bezold and constructed by Edelman, of Munich. It consists of 10 tuning forks, 2 pipes, and a Galton whistle. The forks are weighed and are supplied with movable weights so that they can be tuned for a varying number of tones. The two pipes can also be regulated. This set is invaluable for locating tone gaps and tone islands, and is of absolute necessity in working with mutes. For practical use it is too elaborate and complicated, and the set of Hartmann, consisting of five forks ranging from C, with 128, to C⁴, with 2,048 vibrations, is sufficiently ample. With only two or three forks—a low, a middle, and a high—very good work can be done.

Weber's test.—Wheatstone and Weber working independently found that normally a vibrating tuning fork, whose handle is in contact with the vertex of the skull, is heard more clearly in the ear which has been closed by the finger. This is explained by Politzer

in the following manner: (1) By the increased resonance of the external auditory canal; (2) by the reflection of the waves of sound transferred through the cranial bones to the air in the external auditory canal and thence to the membrana tympani and ossicles; (3) by the altered tension of the membrana tympani and ossicles. In performing this test a fork of medium pitch, such as C¹, is best. As in the physiological experiment, the band of the vibrating fork is placed in the sagittal line of the vertex of the skull. The patient is directed to answer when he hears the sound, whether it is in general on the head or localized in one or the other side. In case of one-sided affections of the sound-conducting apparatus, the fork is heard better or exclusively in the affected ear. Occasionally, however, patients of intelligence and without intent to deceive will answer that they hear the fork on the unaffected side, simply because they think it ought to be heard there. By having the patient close the good ear, thereby simulating an affection of the sound-conducting apparatus, and again asking where the sound is heard, his mistake, whether intentional or otherwise, will be shown. Should he answer that he now hears it in his open ear it is evident that he is wrong, unless there is marked nerve deafness. It is possible to have disease of the sound-perceiving apparatus, so that the fork may sound on the side unaffected by obstruction, due of course to the weakened sound perception as well as sound conduction in his affected ear. If a double labyrinth involvement exists the sound will be localized on the less affected side. Keeping these facts in mind will explain many apparently incomprehensible statements and results.

Rinné's test.—This is a combined testing and comparison of air and bone conduction. Normally air conduction is stronger than bone conduction. This test was described by Rinné, a general practitioner, in 1855, but was practically unnoticed until brought into use by Lucae about 25 years later. It was held by Rinné that in those conditions in which the tuning-fork is perceived longer and stronger through the cranial bones than when held in front of the ear a disturbance of the sound-conducting apparatus exists. On the contrary, if in case of ear disease, it is heard longer before the ear (air conduction) than when in contact with the cranial bones (bone conduction), the sound-receiving apparatus may be considered affected. The results are expressed: Air conduction (AC) is greater than bone conduction (BC) \times seconds, $AC > BC = 10$ (positive Rinné), or $AC < BC$ or $BC > AC = 10$ (negative Rinné).

In practice the duration of time that air conduction persists longer than bone conduction must be determined in normal cases with each fork used, so that accurate comparisons can be made. In old age, as before mentioned, bone conduction is shortened. The technic of

the test is as follows: Hold a vibrating tuning fork (C or C¹) before the patient's ear until it can no longer be perceived, then immediately bring the handle against the mastoid process and instruct the patient to state whether or not he hears it and to tell when it ceases. Should he hear this fork by bone, after air conduction has ceased to be heard, the time may be noted in seconds, for instance the tests would be recorded $AC < BC$ or $BC > AC = 6$.

The manner of performing the test which will prove most convenient will probably be the following: Hold the handle of a vibrating tuning fork against the mastoid of the side to be tested. When it is no longer heard bring it to the front of the ear. Should it then be heard 10 seconds, the result is a positive Rinné, and would be recorded as follows: $AC > BC$ or $BC < AC = 10$. A negative Rinné supported by a positive Schwabach, and a relative failure to hear low tones, but with a perception of high tones, is certain indication of disease of the sound-conducting apparatus. A positive Rinné often persists in spite of middle-ear disease, and the Rinné, of course, is positive in labyrinth affections, but in these cases there is a shortened Schwabach.

Schwabach test.—Schwabach showed that in disease (with obstruction) of the external or middle ears (sound-conducting apparatus) bone conduction is lengthened, while in disease of the auditory nerve the perception is shortened. To perform this test, place the handle of a vibrating tuning fork against the mastoid process of the patient (for this purpose a fork of middle tone, C¹ with 256 vibrations), who is instructed to signal the instant he fails to perceive the vibrations. At that instant transfer the handle to your own mastoid and note the difference in seconds. For this purpose the examiner is presumed to have normal bone conduction. If the examiner fails to hear the fork, presumably the patient's bone conduction is normal or lengthened. Then the examiner should repeat the experiment, but place the fork first on his own mastoid, and the instant it ceases let it come in contact with the patient's mastoid. The difficulties in this test lie in the unilateral affections or in the bilateral affections of unequal involvement. Then it is impossible to exclude the sound or better ear from participation leading to incorrect answers.

Bing's test.—This consists in holding a vibrating tuning fork against the mastoid until it is no longer heard; then closing the meatus with finger will again render the tone audible. If there is already an obstruction of the sound-perceiving apparatus, it will not be heard. If it is heard again, disease of the sound-perceiving apparatus may be inferred. Another test proposed by Bing for use in examination of the deaf is called the "entotic" use of the speaking trumpet. The smaller end of a speaking trumpet is connected to a catheter which has been introduced into the eustachian tube. Sound

waves in this manner are of course directly introduced into the middle ear and are communicated directly through the footpiece of the stapes and round window to the labyrinth. If speech is not heard through the trumpet introduced in the usual way into the ear, but is heard this way, it is evident that the malleus and incus are fixed and that the footpiece of the stapes is immovable.

Gellé's test.—In this test the air is compressed in the ear by a Siegle's pneumatic speculum; then the handle of a vibrating tuning fork is placed on the vertex. It is found in a normal case that the tone is greatly diminished. This is due to the fact that tension of sound-conduction apparatus lowers the sound perception. If, according to Gellé, there is any hindrance of sound conduction, as, for instance, ankylosis of the stapes, there will be no change. On the other hand, with the labyrinth normal and the stapes movable, there will be diminished perception with each condensation. This test has more or less fallen into disuse. It coincides with Rinné in a majority of cases, hence is of no assistance. It is only of value in the several grades of deafness, and has certain objectionable features, especially in labyrinth affections, often causing dizziness, nausea, and nystagmus.

Labyrinth testing.—Properly speaking, the labyrinth includes the cochlea and vestibular apparatus, but it has generally become synonymous with the latter. Disregarding previous theories and the historical development of this branch of otology, the present conception of the labyrinth reaction is: Any disturbance of the labyrinth causes a reflex movement of the eyes termed nystagmus. This nystagmus is a rhythmically associated movement of both globes, capable of division into two component parts—a quick and a slow movement. The nystagmus takes its name from the quick component. When the rapid movement is to the left it is left nystagmus, and vice versa. The slow movement is the one controlled by the labyrinth, while the other is governed by the cerebellum. Each semicircular canal controls the movement in its own plane; disturbance of the horizontal semicircular canal causes nystagmus in a direction from side to side, while a disturbance of the sagittal canal produces an up and down movement of the eyes, while the frontal gives the rotatory type.

Nystagmus has been divided into three degrees: First (weakest), with the patient looking in the direction of the fast component; should he look straight ahead it weakens or disappears. The second degree is reached when the nystagmus retains its force on looking ahead, though in case there is a right nystagmus it disappears on looking to the left. In cases presenting the third degree, looking in the direction of the slow movement will not cause its disappearance. Spontaneous nystagmus can be traced, if weak, by having the patient

look from right to left and back, or up and down, taking note of the direction of the fast movement.

The principle of the production of nystagmus is based upon disturbing the balance or exciting by some means a flow of the endolymph from the small end to the ampulla of one or another of the semicircular canals. This may be produced, following the present Vienna school, which in turn based its work upon Ewald's experiments, by means of several stimuli—first, caloric; second, turning; third, pressure, or the fistula tests. A galvanic reaction is also sometimes used. It is found that turning rapidly to the right and stopping suddenly (using a revolving chair), making about 10 revolutions, produces nystagmus normally to the left, lasting about 20 seconds. The movements are horizontal if the patient is sitting erect, because the horizontal canal has been brought into revolution and agitation. The other results follow. The most easily applied of these tests is the caloric, and is made in the following manner and differs as to whether or not hot or cold water is used; in fact, the results are diametrically opposed. Less disturbance is caused by hot water, and the after effects are not so unpleasant. Using an ordinary fountain or irrigating syringe, direct a stream of hot water (80 to 100° F.) against the middle ear for 30 to 60 seconds, depending upon the course of the canal and the presence of obstructions to the flow. With hot water the nystagmus is directed to the same side, and with cold water to the opposite side (holding the head erect). Turning the head influences the direction of the fast component. For instance, inclining the head to the left and irrigating the right ear the nystagmus is not to the right but to the left. The general rule is that hot water gives nystagmus to the same side, while cold water gives one to the opposite side.

The fistula reaction is produced only in case there is a lesion of the bony capsule of the semicircular canals or one of them, so that direct pressure comes upon the membranous labyrinth. It is made with air pressure from a close-fitting olive attached to a Politzer bag. By compression acting on the affected side there is a slow movement away from that side, while aspiration has the opposite effect. The galvanic reaction is not considered accurate by many and will not be taken up.

In addition to the functional tests to outline lesions of any specific part of the labyrinth, there are general tests of equilibrium which show not only the condition of the ear but the cerebellar control and response to disturbances of balance. For work such as aviation, in addition to perfect hearing perfect balance should be demanded. Binocular vision has a bearing on equilibrium through one's ability to localize one's position, as can be readily seen when the various

tests for unstable equilibrium used in neurological examinations are considered, in which the eyes are closed during the test. A large number of muscle tests have been evolved by von Stein and are based in part upon labyrinth control.

A FEW POINTS IN DIAGNOSIS OF GASTRIC AND DUODENAL ULCER BY MEANS OF THE X-RAY.

By A. L. CLIFTON, Passed Assistant Surgeon, United States Navy.

With the increased use of the X-ray as a means of diagnosing diseases of the chest and abdomen, it has now become a routine measure in the larger civil hospitals to make a fluoroscopic examination after a bismuth meal in all chronic abdominal cases. This examination is supplemented by a series of plates taken at stated intervals. By these methods much information can be obtained that is not possible by any other means. However, X-ray is only valuable when taken in conjunction with the physical signs and laboratory findings.

With the fluoroscope it is often possible to diagnose accurately tumors and ulcers occurring in the stomach wall.

The patient should be properly prepared before X-ray examination of the gastro-intestinal tract is made. The usual routine is to give an ounce of castor oil the day before the examination is to be made, the patient not to take any food after the evening meal on the day preceding the examination. At present bismuth subcarbonate or oxychlorid is used in gastro-intestinal diagnosis. Barium sulphate may be used instead of bismuth, as it is cheaper and if properly prepared is not dangerous. Potato pap or any cooked cereal may be used as a vehicle for the bismuth.

For the purpose of examining the stomach with the fluoroscope two meals are given. The first meal consists of a half ounce of bismuth in a glassful of water. The second meal consists of 2 ounces of bismuth and 16 ounces of buttermilk. The size, position, peristalsis, tone, and breaks in outline of stomach wall are noted. The normal stomach grips the bismuth closely and assumes a tubular shape. The gas bubble at the top of the mixture aids in determining the amount of secretion in the organ. The peristaltic waves are studied, and the time the stomach starts to empty is noted.

For the purpose of determining whether a residue is present a bismuth-oatmeal combination is given. This meal consists of 4 ounces of bismuth subcarbonate in 10 ounces of oatmeal.

It is variously estimated that the stomach empties itself in from two to six hours. All agree that a normal stomach should be empty six hours after a meal has been taken.

There are four different types of stomachs described, based on tone and on the relation of the pylorus to the greater curvature. Classi-



412-1

12-2

Clifton—Gastric Ulcer.



Fig. 3.—Six-hour residue in a case of gastric ulcer. Over one-half of the meal remained in the stomach. Case proved at operation.

412-3

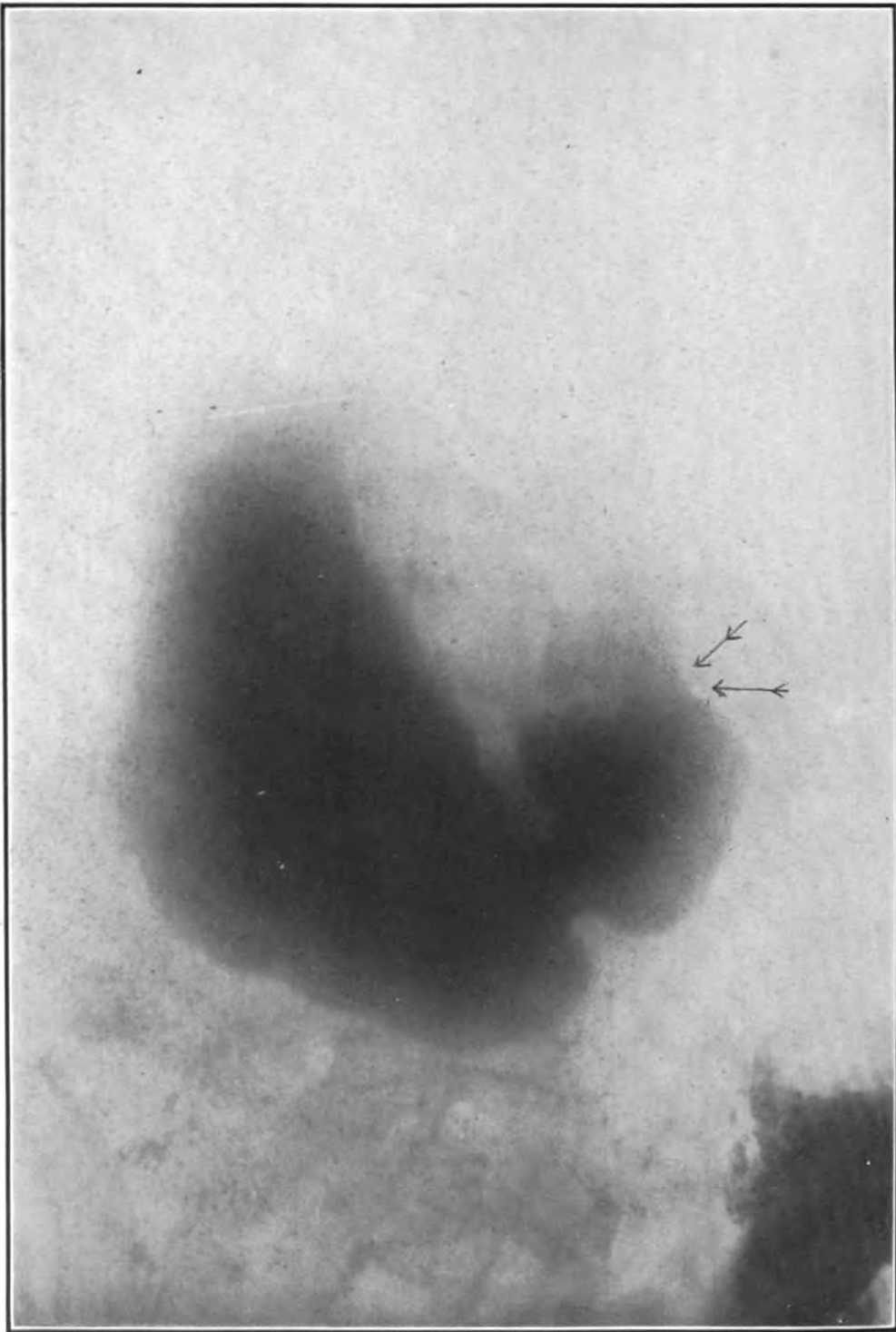


Fig. 4.—Duodenal ulcer. Note the incisura opposite the ulcer, also the failure to outline the cap definitely. (Stomach reversed in printing.)

412-4

Clifton—Gastric Ulcer.



Fig. 5.—Small residue in the stomach at the end of 12 hours in a case of gastric ulcer with pyloric obstruction.

412-5

Clifton—Gastric Ulcer.

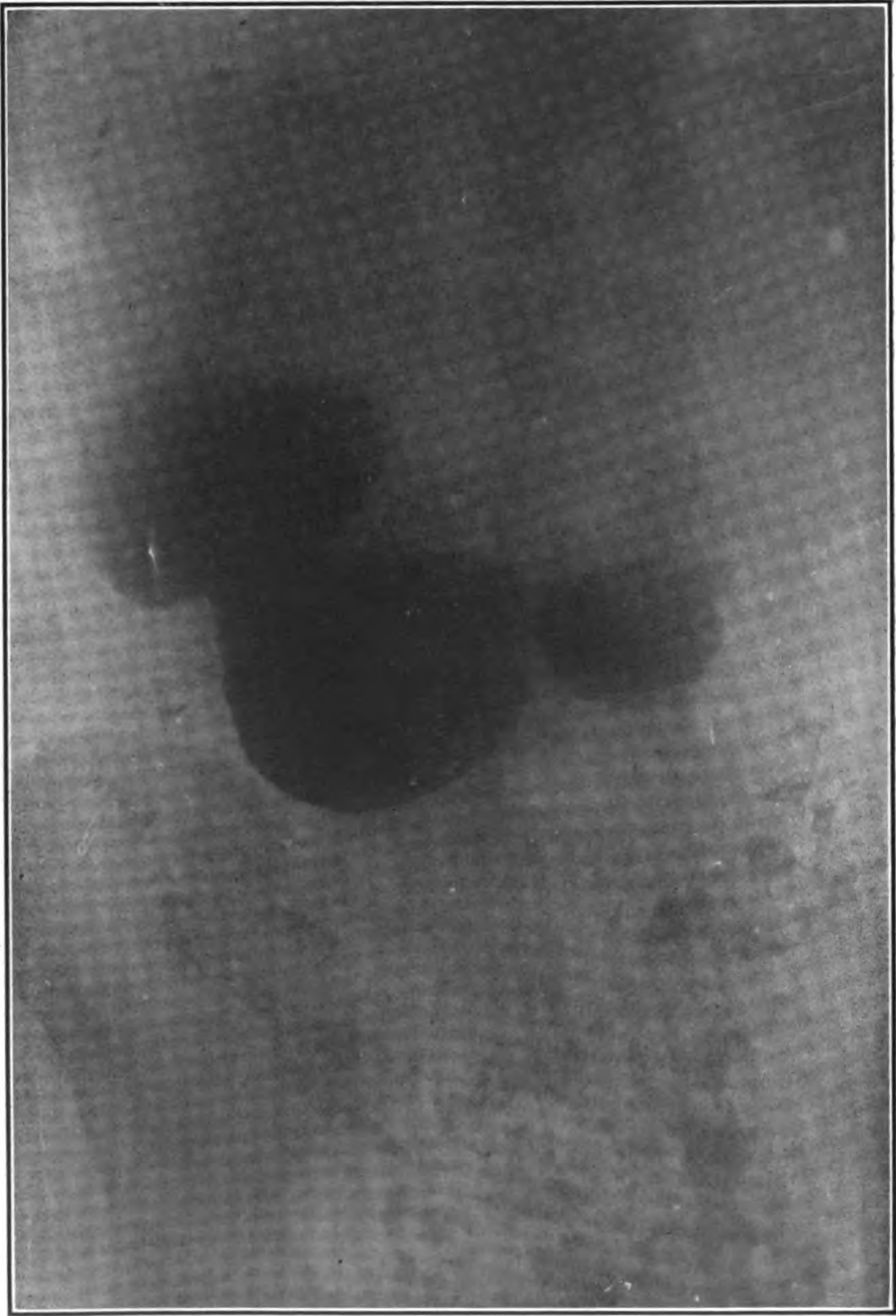


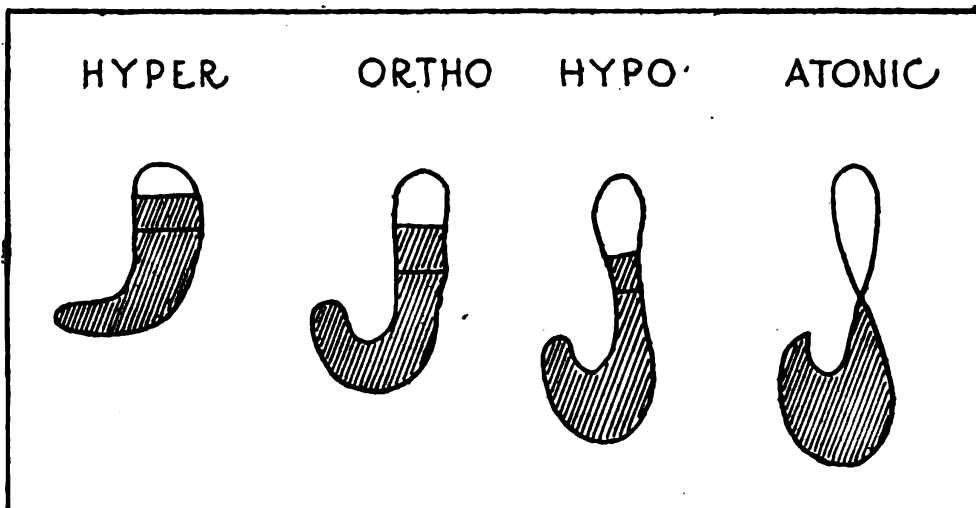
Fig. 6.—Deep peristaltic indentations in the stomach in a case of duodenal ulcer. (Stomach reversed in printing.)

412-6

fication: Hypertonic; orthotonic, hypotonic, and atonic. The hypertonic empties itself in from two to three hours; orthotonic, three to four hours; hypotonic, four to five hours; atonic, five to six hours. Pictures of different types follow.

Stomachs are also described according to shape, as "fishhook," or "steer horn." "Fishhook" is the more common form, and ulcers are found in this type more than the "steer-horn" type. The "steer-horn" type is said to be most commonly associated with gastric carcinoma.

A marked residue at the end of six hours denotes pyloric obstruction and in at least 50 per cent of cases this is due to gastric ulcer. Duodenal ulcer, carcinoma obstructing the pylorus, scar tissue, tumors pressing from the outside of the stomach, or adhesions around the gall bladder may also cause a residue.



In carcinoma of the stomach, unless obstructing the pylorus, there is usually found hypermotility, the stomach emptying itself in a very short time. Duodenal ulcer is also associated with hypermotility, the stomach completely emptying itself in from one to two hours. A residue in the stomach in duodenal ulcer is due to reflex spasm of the pylorus. Residue in the duodenum may be due to cicatricial contraction.

The motility of the stomach then is a very important sign to be considered. Where there is marked pyloric obstruction the peristaltic waves are usually rapid and deep, caused by the stomach's attempt to overcome the obstruction. When this condition exists for a long period of time a large dilated stomach is usually found.

Relaxation of the pylorus depends on several factors: One, proximity of the ulcer to the pylorus; two, patency of the pylorus; three, peristalsis; four, position of the stomach. Pyloric ulcer is of two classes; first, where the tone of the stomach is normal and there

is no peristalsis; second, where there is atony and great peristalsis. The latter is the more common.

It is essential to distinguish between tone and peristalsis. Tone of the stomach is important in causing it to keep its tubular form. An example of this is shown by the fluoroscope which demonstrates that the cardia of the stomach moves on respiration, but the greater curvature does not, due to tone.

Gastric peristalsis depends upon food, distention, and acidity of the gastric contents, and is divided into normal, diminished, and increased.

The stomach is normally in a state of collapse. When the bismuth enters a narrow streak is seen along its left wall. As the organ is filled the lower pole is supposed to sink only slightly, the stomach assuming a tubular form due to muscular tone, the fundus remaining clear, due to gas. From observing a large number of apparently normal stomachs it has been found that when the stomach is completely filled with a bismuth-buttermilk combination it sinks to the level of the umbilicus or even 1 or 2 inches below, and as soon as it is half emptied it resumes its normal position. The transverse colon is pushed downward to a certain extent by the filled stomach, and if the colon be lined with bismuth and sagging from the weight of its contents an entirely erroneous idea may be gathered from the plate.

In the atonic stomach the bismuth falls to the bottom and there is no attempt on the part of the organ to squeeze its contents.

Hyperperistalsis has always been associated with duodenal ulcer, and with this condition the stomach frequently shows great indentations on the greater and lesser curvatures. Normal peristalsis affects the lesser curvature for a short distance only. Hyperperistalsis is also associated with hyperacidity. As mentioned above, hypertonicity is associated with duodenal ulcer, the stomach emptying itself rapidly.

In fluoroscopic examinations of cases of duodenal ulcer the fluoroscope shows the bismuth flowing immediately out of the stomach into the duodenum. Ordinarily the bismuth passes rapidly through the duodenum, but in cases of duodenal ulcer the bismuth is slow in passage. Secondly, there is a failure to outline distinctly the duodenal cap or break in the outline of the cap. Thirdly, the crater of the ulcer can be seen filled with bismuth, and a constriction opposite the ulcer is often noted. Fourthly, there may be a permanent contraction as seen in hourglass stomach.

It has been estimated by various writers that 98 per cent of duodenal ulcers occur in the first portion of the duodenum. Pictures of the cap are at times difficult to get, and are best taken with the patient in the prone position, or lying on the right side.

Ulcers of the stomach are described as (1) linear abrasions of the mucous membrane, (2) penetrating ulcers with a deep crater, and as (3) perforating ulcers. These may become filled with bismuth and show distinctly on the plate. Opposite the ulcer there is usually found an indentation due to the contraction of the circular muscular fibers. This indentation can be massaged under the fluoroscopic screen to determine whether it is a peristaltic wave or a permanent contraction.

Delayed opening of the pylorus following the administration of bismuth water is very commonly associated with ulcer of the stomach if hyperacidity is present. A large atonic stomach with settling of the bismuth to the bottom is suggestive of gastric ulcer.

Hourglass stomach is a common condition in gastric ulcer, and is a result of contraction of scar tissue, constriction by bands of adhesions, or spasm. The stomach appears as two chambers with a canal joining them. The caliber of the canal varies, of course, in different cases. By massaging the stomach back of the screen the food can be forced along, and, if due to peristalsis, the contraction will disappear. Perforating ulcers may perforate into the gall-bladder or posteriorly into the pancreas. A bismuth residue can be seen at times in a diverticulum from perforation, even after the stomach has emptied. In all cases of gastric or duodenal ulcer a pressure point of tenderness is a very important sign. This symptom can be elicited during a screen examination.

Interpretation of plates in stomach cases is extremely difficult, and can only be accomplished after long experience. In this connection it is believed that the study of a large number of normal cases is necessary before taking up pathological conditions. One has only to peruse the literature on the subject of gastric and duodenal ulcer to come to the conclusion that the radiographic signs are in no way pathognomonic, but have become a great aid in diagnosing obscure conditions when taken in connection with the clinical symptoms.

To sum up briefly, gastric ulcer is associated with:

- (1) Six-hour residue.
- (2) Large, dilated, atonic stomach.
- (3) Hourglass stomach.
- (4) Crater of ulcer visible with the incisura opposite.
- (5) Delayed opening of the pylorus.

Duodenal ulcer is associated with:

- (1) Hyperperistalsis.
- (2) Hypermotility. Bismuth pouring from the pylorus.
- (3) Lagging of bismuth in duodenum.
- (4) Failure to definitely outline cap.
- (5) Crater of ulcer filled with bismuth with the incisura opposite.
- (6) Hourglass contraction.

The prints accompanying this article were made from typical cases and show the more important conditions associated with ulcer of the stomach and duodenum.

In our routine work at this hospital we have given bismuth meals to a large number of cases who have shown nothing pathological in the gastro-intestinal tract; however, the negative findings are at times very valuable.

From our records it would appear that gastric and duodenal ulcers do not occur very frequently in the naval service.

THE DAMAGE OF SYPHILIS TO THE NAVY.

By G. F. COTTLE, Passed Assistant Surgeon, United States Navy.
















When Metchnikoff demonstrated that calomel ointment applied immediately after exposure to infection would prevent syphilis in the monkey and in man, it was thought the day for the practical elimination of syphilis from the naval personnel had dawned.

During the last six or seven years a large amount of hard work has established this preventive measure on a sure footing, and a reduction in the incidence of syphilis in the Navy has been brought about, but this reduction has not been as great as was anticipated upon the announcement of the discovery. On certain ships and under the enthusiastic management of a few medical officers results have been attained commensurate with early anticipations. However, in spite of all the efforts of the medical officers of the Navy and in spite of the cooperation of both officers and men, syphilis still stands near the top of the list of diseases that cause a large number of sick days. No relaxation of vigilance in the application of this preventive should be allowed; its failure to eradicate the disease is not due to its inefficiency but to the inherent difficulties attendant upon its universal and perfect application. We must seek other and additional measures if we are to reduce the amount of damage to the service occasioned by this disease.

In the report of the Surgeon General of the Navy for the year 1912 we find that 66,210 sick days were due to syphilis, 6,370 among the force afloat, 3,577 at stations and yards, while in hospitals and hospital ships the total loss was 56,263 days. The average complement of the Navy during this period was practically 57,000 and the number of primary admissions for syphilis was 1,665. These figures mean that during this year syphilis took from the available working personnel the equivalent of 181 men for the year, 66,210 sick days being one hundred and eighty-one times the number of days in a year. If from Table No. 5 of the above report we extract a list of

all classes of disease and injury which for the year give more than 10,000 sick days each, we have the following table:

DAMAGE IN SICK DAYS FROM CERTAIN DISEASES AND INJURIES IN THE NAVY AND MARINE CORPS DURING THE YEAR 1911.

Disease or injury.	No.	Relation by scale.
SYPHILIS.....	66,210	
GONOCOCCUS INFECTION	64,263	
SOFT CHANCER.....	32,439	
EXTERNAL VIOLENCE (UNC)	27,409	
FRACTURES	20,636	
DISEASES OF PHARYNX	17,541	
APPENDICITIS	16,326	
DISEASES OF VEINS	16,251	
HERNIA AND OBSTRUCTION	15,922	
DISEASES OF EYES.....	15,284	
DISEASES OF EARS.....	14,049	
TYPHOID.....	14,024	
ACUTE ABSCESS.....	13,982	
DISEASES OF SKIN	12,090	
TUBERCULOSIS OF LUNGS.....	10,854	

This year has been selected because the report shows the damage from typhoid fever before the full use of antityphoid vaccination. The above table shows that syphilis caused four times as much damage as typhoid. To-day typhoid is no longer injurious, the number of cases and the damage in sick days is gone or reduced to a negligible factor. The recognized efficiency of antityphoid vaccine was of no value to the Navy until by departmental order its use was made compulsory. In the case of typhoid fever, increased knowledge became of practical benefit only by the enforcement of this measure. During the last few years a knowledge of the cause of syphilis has come, remarkable improvement in accuracy in diagnosis has been brought about, and a very real increase in the rapidity and certainty of cure has been made, but the damage in sick days from this disease has not been reduced in proportion to these new discoveries. If the application of knowledge could make typhoid fever lose its capacity for harm to the service, is there not some way in which the new knowledge of syphilis may be made productive?

Before the work of Schaudinn, Wassermann, Ehrlich, and others illuminated the age-long dimness of our knowledge of syphilis, it was necessary to dumbly await the appearance of "secondaries," the metastatic signs of systemic infection. Then, when the patient became well infected and a menace to his shipmates, we began the laborious eradication of open lesions, with the slow and often interrupted return of the patient to health and usefulness, and finally after two or three or more years of almost continuous treatment we

produced that quiescent or latent stage then called a cure. To-day it is possible to diagnose syphilis by the microscopic detection of the *Treponema pallidum* in the first week of the disease while the latter is still a local infection, or by means of the Wassermann reaction to diagnose it definitely before the systemic distribution of the treponemata has reached that wide dissemination which produces the so-called open lesions. No longer need the patient menace the health of his shipmates, no longer need he submit to that wearisome and depressing period of two or three years of almost continuous treatment, for salvarsan and mercury given in sufficient dosage will stop the advance of his infection almost immediately and in three months take him nearer a cure than could two years of the old therapy.

Returning a moment to our statistics, we note that of the 66,210 sick days 6,370 occurred in the force afloat, 3,577 in the force at stations and yards, while 56,263 were in hospitals or on hospital ships. It can readily be imagined that a syphilitic under treatment on board ship or at a station or yard may be available for duty in an emergency, even though on the sick list, and that sick days here do not represent a total loss. Once the patient enters a hospital, however, his services as an effective member of the naval force are ended until his return to ship or station. The sick days credited to syphilis from hospitals and hospital ships being therefore 56,263, means that the service lost from its available working force 154 men for the year from this disease alone. During the past two years it has so happened that, with the exception of a short period of two months, my duty has kept me absolutely separated from hospitals and hospital ships, and yet during that time I have had to care for 20 cases of recently acquired syphilis. This experience has led me to a firm belief that, except in unusual circumstances, syphilis can be treated and cured without a single hospital sick day, and that if syphilitics were as a rule treated on board ship or at the station or yard and not sent to a hospital a real increase in naval efficiency would be brought about by a marked reduction in the number of sick days. If early diagnosis and intensive salvarsan-mercury treatment are practiced, six sick days per patient are all that are necessary. This allows one day for each administration of salvarsan. Some cases diagnosed during the first week might have fewer sick days, others not found as early might have more. Six is taken as an average necessary minimum per patient for primary admissions.

With such a basis for estimate, the number of primary admissions for the year having been 1,665, a minimum number of necessary sick days could be taken as six times 1,665, or 9,990 days. If now we subtract these necessary sick days from the 66,210 actual ones, we have a possible saving of 56,220 days, or 84 per cent less actual dam-

age to the available working force of the Navy, or an addition of 154 men per year. This estimate takes no account of sick days included in the 66,210 due to old recurrent cases of syphilis, but this factor is a small one and can be neglected, since the only reason for retailing these figures is to show approximately what a tremendous saving of sick days can be made by treating syphilis in such a manner that hospital admissions for this disease become largely unnecessary.

In order that such a reduction of damage due to syphilis may become a fact, the ideal of an average of about six sick days per patient must be kept in view and energetic measures instituted to make this ideal a living fact. Until very recently two factors have made even a struggle to attain this ideal very difficult; first, the early detection of the *Treponema pallidum* in the exudate of the primary lesion has been exceedingly difficult on board ship and at stations and yards, because the dark field illuminator is too complicated and expensive an instrument for issue to every ship and station and because the various stains were too difficult, complicated, or unreliable to meet the requirements of rapid clinical work; and, second, because it has been difficult to get approval of requisitions for ships and yards for salvarsan or neosalvarsan, without which drugs the treatment of syphilis sinks back to the old level of 10 years ago. The first practical difficulty made early diagnosis difficult; the second made efficient rapid treatment impossible except in or near hospitals or hospital ships.

This year a simple method of detecting the *Treponema pallidum* has been evolved. It is at once so quick, easily obtainable, certain, and clinically applicable that it seems reasonable to summarize it here in a footnote, though it has already been quoted in the Bulletin for July, 1914, page 506.¹

It is to be hoped that in time the bureau will be ready to issue neosalvarsan or salvarsan to every ship and station. Several years of experience with these drugs has demonstrated to me that their administration on board ship or at stations and yards is as practicable as at a hospital. The apparatus needed is simple, found in the

¹ Birt, C. The best method of staining *Treponema pallidum*. Jour. Roy. Army Med. Corps, xxii, No. 3, March, 1914.

Adaptation: Dry film of suspected material in air, do not fix by heat. Pour Hüge's fluid over film, renewing several times in one minute. Wash with water. Place tannic-acid solution on slide and heat till steam arises, leave for half a minute, then wash with water half a minute. Without drying apply silver solution, heat till steam arises, leave for half a minute, wash with water, dry, mount in balsam. Examine with oil immersion lens for jet black treponema.

Hüge's fluid: One c. c. acetic acid, 20 c. c. formalin, 100 c. c. distilled water. Tannic-acid solution: Five per cent solution tannic acid in a 1 per cent watery solution of carbolic acid. Silver solution: Dissolve a crystal of silver nitrate in 5 c. c. of distilled water in a test tube, add a minute drop of ammonia to get a slight turbidity. Do not add an excess of ammonia, or the solution will become clear again and thus be of no value.

regular armamentarium, and the drug safe enough if a simple aseptic technic and reasonable care be used.

If a real reduction in sick-day damage from syphilis is possible, it will never be realized until the present-day knowledge of diagnosis and treatment is used as carefully and thoroughly as we used anti-typhoid vaccine, so it seems reasonable to detail a few points in the practical application of this knowledge to actual service conditions. To gain this reduction in damage, early exact diagnosis and intensive salvarsan-mercury treatment are the essentials, but these essentials though simple to state are difficult to attain. The natural desire to conceal venereal disease, the hope in a patient's mind that a small, apparently unimportant sore may heal of itself, the fear of losing a few liberties through restriction to the ship or station, these lead a considerable number of men to delay in reporting venereal disease until it is too late to make an early diagnosis from the primary lesion. This tendency toward concealment of venereal disease should be sharply counteracted by frequent inspection of the enlisted force and by severe punishment of discovered cases of concealment. Too great stress can not be laid upon the importance of this measure. On board ship especially a considerable amount of persistence is necessary to make the inspection efficient and complete, for it is impossible to examine all the men any one day or hour as a routine, because drills, watches, work, special detail, etc., make it difficult to get those who desire to avoid inspection, unless a well-defined plan is followed. If we overcome the tendency toward concealment and see all venereal sores in the first week of their appearance it then becomes necessary to examine microscopically the exudate of each one and make a careful search for the treponema in every case.

The importance of having a method at least as easy of application and as certain as the examination of sputum for the tubercle bacillus is apparent when we remember that perhaps nine out of every ten lesions of this nature are chancroidal and will give a negative result. Our aim must be to find the *Treponema pallidum* in every case where it is present. If the large number of negative results makes this examination tedious and disheartening, it must ever be kept in mind that persistence and thoroughness in this measure will contribute directly to the reduction in the number of sick days per patient and will shorten the duration of treatment and increase the certainty of cure. If we allow the golden opportunity for early diagnosis to slip by, dependence must then be placed on a Wassermann or we must wait for secondaries to appear. It is a general rule that the older the lesion the less easy it becomes to find the treponema.

Once an early diagnosis is reached the immediate use of intensive salvarsan-mercury therapy will prevent the occurrence of open

lesions, keep the patient well enough to work, remove the necessity or advisability for hospital care, and do away with any real loss of his services to the Navy.

When salvarsan first appeared on the market it was a new and untried drug, and its administration was somewhat too complicated for use on every ship. In order to avoid any serious complications, it was then reasonable to restrict its use to hospitals and hospital ships; but now that the soluble and simply prepared solution of neosalvarsan has appeared the necessity for normal salt solution made with chemically pure sodium chlorid and the careful neutralization with potassium hydroxid are gone. Only the most simple apparatus is needed. A large glass funnel, a rubber tube, a needle to enter the vein, a medicine glass, a glass rod, and a bottle of freshly distilled water are the essentials. The sterilization of these articles by boiling is possible anywhere. It has been found that the distilled water of the ship may be sterilized and then used. The only precautions necessary are the silver nitrate test of the water in the evaporator room by the medical officer and the use of this especially tested sample the day it is obtained. At a station or yard where no ship's still is available a small glass still can be obtained at very slight cost.

In conclusion, it is believed that sick days in hospital for this class of patients should be reduced to a minimum, that except in unusual cases syphilis should be treated aboard ship or at the station or yard, that early discovery of the treponema is now practicable, that neosalvarsan should be issued to ships and stations, and that these measures if carried out will increase naval efficiency and do much toward removing the damage in sick days now yearly charged to syphilis.

RECENT CONCEPTIONS OF BRONCHIAL ASTHMA.

By M. H. SICARD, Assistant Surgeon, Medical Reserve Corps, United States Navy.

Until recently asthma was described as "so imperfectly understood that it is impossible to give a satisfactory definition" (Osler). The pathology included spasm of the bronchi and respiratory muscles and vasomotor disturbances of the bronchial mucous membrane. Etiology presupposed a neurotic basis, in addition to other factors, such as hypertrophied turbinates, climatic effects, gout, etc.

Although we must still admit that it is imperfectly understood and that its etiology is by no means clear, yet the past few years have added much information which may be a clue to the eventual relief of this harassing disease.

Asthma is unquestionably in some cases an expression of anaphylaxis. Hypersensitization may be congenital or acquired; if ac-

quired, it may be from bacterial protein or from the exudate of a focus of infection. If inoculation takes place by an increased inoculation from the infective focus, anaphylaxis occurs in the form of an attack of bronchial asthma. Removal of the focus of infection may cure the asthma. Clinically, it resembles the hypersusceptibility produced in animals by the injection of small doses of foreign proteid. Patients with this disease have become sensitized to some form of protein by absorption from the alimentary canal, or from some focus of infection, and react with an attack of asthma upon an intoxicating dose of the poison (Meltzer).

In some cases the smell of horses or of the stable in a sensitized individual will bring on an attack. Sometimes the injection of horse serum, even in the form of antitoxin, will produce an attack. A friend of mine who received a small immunizing dose of diphtheria antitoxin had such a severe anaphylactic reaction with asthma that his life was despaired of. Asthmatic attacks occurring with hay fever, and due to the pollen of ragweed, goldenrod, etc., are of the same origin. Inoculation with constantly increasing emulsions of these pollens, or polyvalent emulsions, will cure or improve the attacks. Egg protein also causes attacks in some individuals.

Another source of attack, and one with which I have been working, is due to the presence of bacteria, primarily *Streptococcus viridans*, secondarily *Micrococcus catarrhalis*. These cases are obviously infective; they occur with bronchitis, and often run an acute course with febrile reaction, increase in pulse rate, cough, and sputum. If the sputum be collected in a sterile cup or Petri dish, washed, streaked on a blood plate and on North's medium, *Streptococcus viridans* can often be grown. Whatever the variety of germ, however, whether streptococcus, pneumococcus, or catarrhalis, an autogenous vaccine will cure the attacks. It is best given once (for children) or twice (in cases of adults) a week for 12 to 20 injections, constantly increasing in strength.

One or two cases may be of interest:

A little boy of 5 had attacks which began at about 18 months of age and occurred at intervals of about 6 weeks or 2 months, to the great distress of the parents. It was thought to be hereditary, as other members of the family had had it; a smear from his larynx yielded a hemolytic streptococcus, and a vaccine was made and administered for 14 doses at weekly intervals. No recurrence has been observed in six months.

A young man of 20 had severe attacks regularly every three weeks with moderate bronchitis between attacks, loss of flesh, and inability to work; no sign of tuberculosis, and sputum negative. Sputum, however, did yield *Streptococcus viridans* and *Micrococcus catarrh-*

alis. Autogenous vaccines were made and administered. No attack has occurred since the first injection and patient feels splendidly.

Allen quotes several cases of cure from the use of autogenous vaccines, some cases of asthma, some of chronic bronchitis, some combined. Hastings has also had a number of successful cases (unpublished). There is much more work to be done on the subject, and I do not doubt that the scope of the bacterial cases can be much broadened.

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U. S. NAVAL MEDICAL SCHOOL LABORATORIES.

Additions to the pathological collection, United States Naval Medical School, April-June, 1915.

Accession No.	Tissue.	Diagnosis.	Collected by or received from—
1116.....	Blood...	Chronic lymphatic leukemia....	Passed Asst. Surg. J. J. A. McMullin.
1117.....	Various tissues.	.....	Passed Asst. Surg. G. F. Cottle.
1118.....	Spleen.	.....	United States Naval Hospital, Washington, D. C.
1119.....	Kidney.	Lymphatic leukemia.....	Asst. Surg. F. L. Conklin, Medical Reserve Corps.

Additions to the helminthological collection, United States Naval Medical School, April-June, 1915.

Accession No.	Parasite.	Host.	Collected by or received from—
19914.....	Mites of Tsutsugamushi fever.....	Mouse...	Passed Asst. Surg. R. H. Laning.
19915.....	Dibothriocephalus latus.....	Homo...	Do.

SUGGESTED DEVICES

A VENEREAL HEAD.¹

By G. F. COTTE, Passed Assistant Surgeon, United States Navy.

Venereal prophylaxis and the treatment of gonorrhea bring a large percentage of the crew in contact with the sick bay and with the Hospital Corps. On this ship with a crew of 700 men during a period of four months 572 men have taken prophylactic treatment 1,905 times. That means 81 per cent of the crew have in that time admitted exposure to venereal disease one or more times and have taken the prophylactic treatment for it. Sometimes after a liberty as many as 100 men apply for treatment. In addition, from 10 to 20 men are taking treatment daily for acute or chronic gonorrhea. The men coming from liberty into the sick bay bring mud, dust, and noise into the quiet cleanly environment of the sick; the men coming three or more times a day for the treatment of acute or chronic gonorrhea often of necessity come grimy from the bunks, dirty from their work, or wet from the decks. The treatment and prophylactic care of these diseases should be carried out in a clean, decent place with some degree of privacy. A prophylactic stand has been supplied to some ships. It is good in itself, but is lacking in one necessary feature—running water.

On the *North Carolina* a corner of the crew's head has been walled off. This space is kept locked except when in use, and at stated hours a hospital apprentice is on duty there to superintend, direct, and record the work done. He is also responsible for the cleanliness and order of the room. This space is light and well aired by two ports. It has a tiled floor. On the wall a bulletin board contains instructions to the apprentice in charge, and the bureau's confidential circulars Nos. 1, 2, and 3, giving detailed instructions to men who have gonorrhea, chancroid, and syphilis. Three signs in large printed type give briefly the exact method for prophylactic treatment, and under each sign the things needed for each step are placed. The containers for solutions, disinfectants, and syringes were taken from the prophylactic stand found on board; they are white enameled iron cans with covers. The work of fitting out this room was done in one day by the ship's carpenter and the coppersmith, and its cost was

¹ Head: Service vernacular for toilet.

practically nothing. Only four seats of the head have been used and this reduction in the capacity of the head has not been detrimental. The trough of the head with running water in it carries all wastes very well.

Six months' use of this venereal head has proven its usefulness. Both the men and the apprentice have been more ready to carry out this important work than when the prophylactic stand was in use in the isolation ward, and the result has been that prophylaxis has been willingly and effectively taken, and the complications of gonorrhea have practically disappeared, with a reduction in sick days from venereal disease.

A sketch of the essentials of this place is appended. It shows the ordinary crew's head, four spaces, with one partition removed. The containers for solutions, disinfectants, and syringes are in a galvanized iron shelf perforated to hold them. The stock solutions are in large bottles in a wooden shelf box. Each patient after using a syringe washes it in the basin of water, then places it in the disinfectant solution. From the disinfectant the apprentice removes it after a sufficient interval and washes it in clean water, then in boric acid solution, when it is again ready for use. This method seems to prevent cross infection with its attendant evils. A large supply of syringes is kept in use.

The advantages of this room have been so great that I have been led to write this brief description of it in the hope that should the plan appeal to others, as it has to me, it may be introduced on other ships, or that should some other medical officer have evolved a better plan he may be stimulated to describe it so that his plan may be considered by those who have the responsibility for the care of these diseases aboard ship.

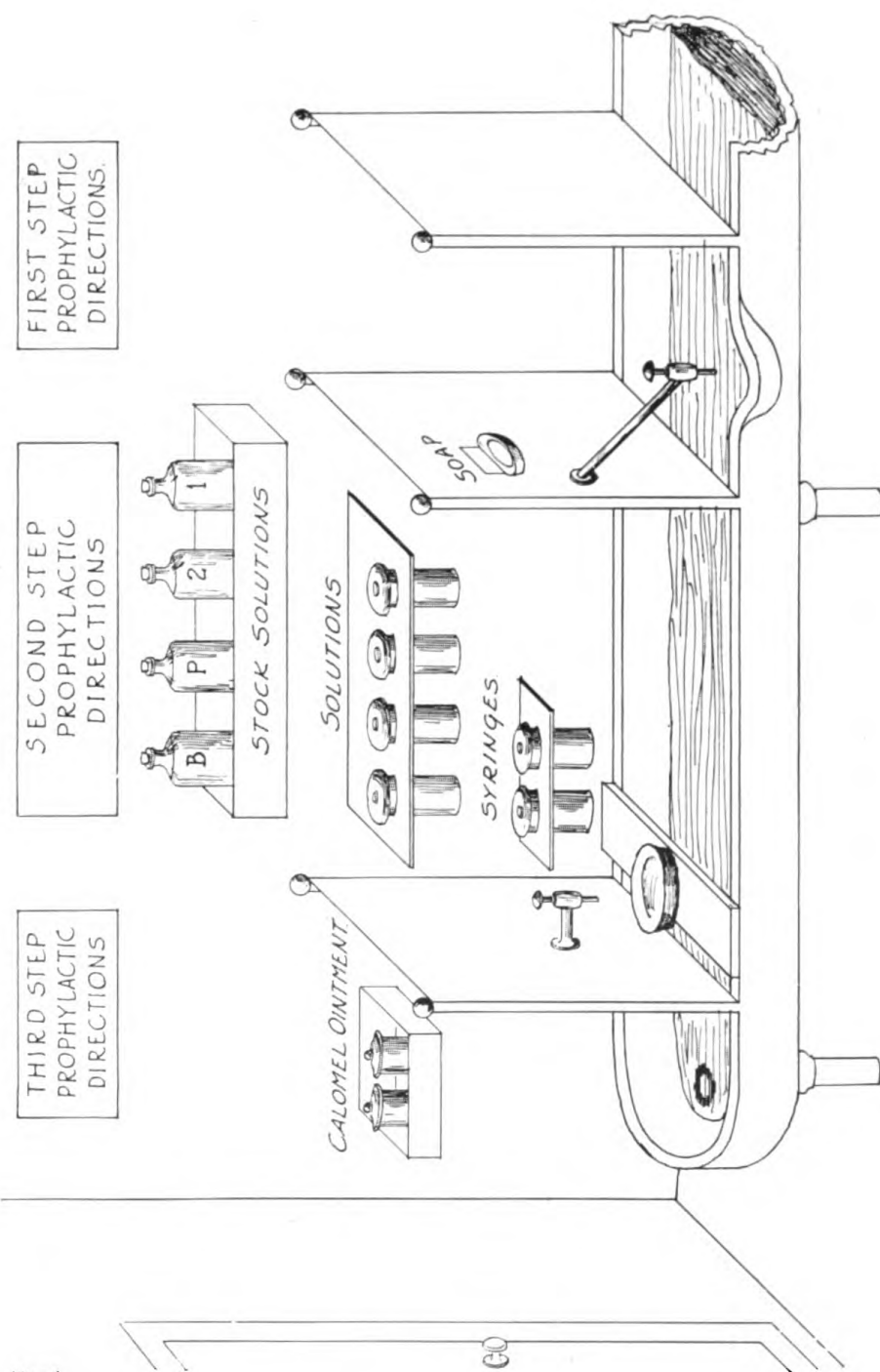
A NEW MESSING SYSTEM FOR NAVAL HOSPITALS.

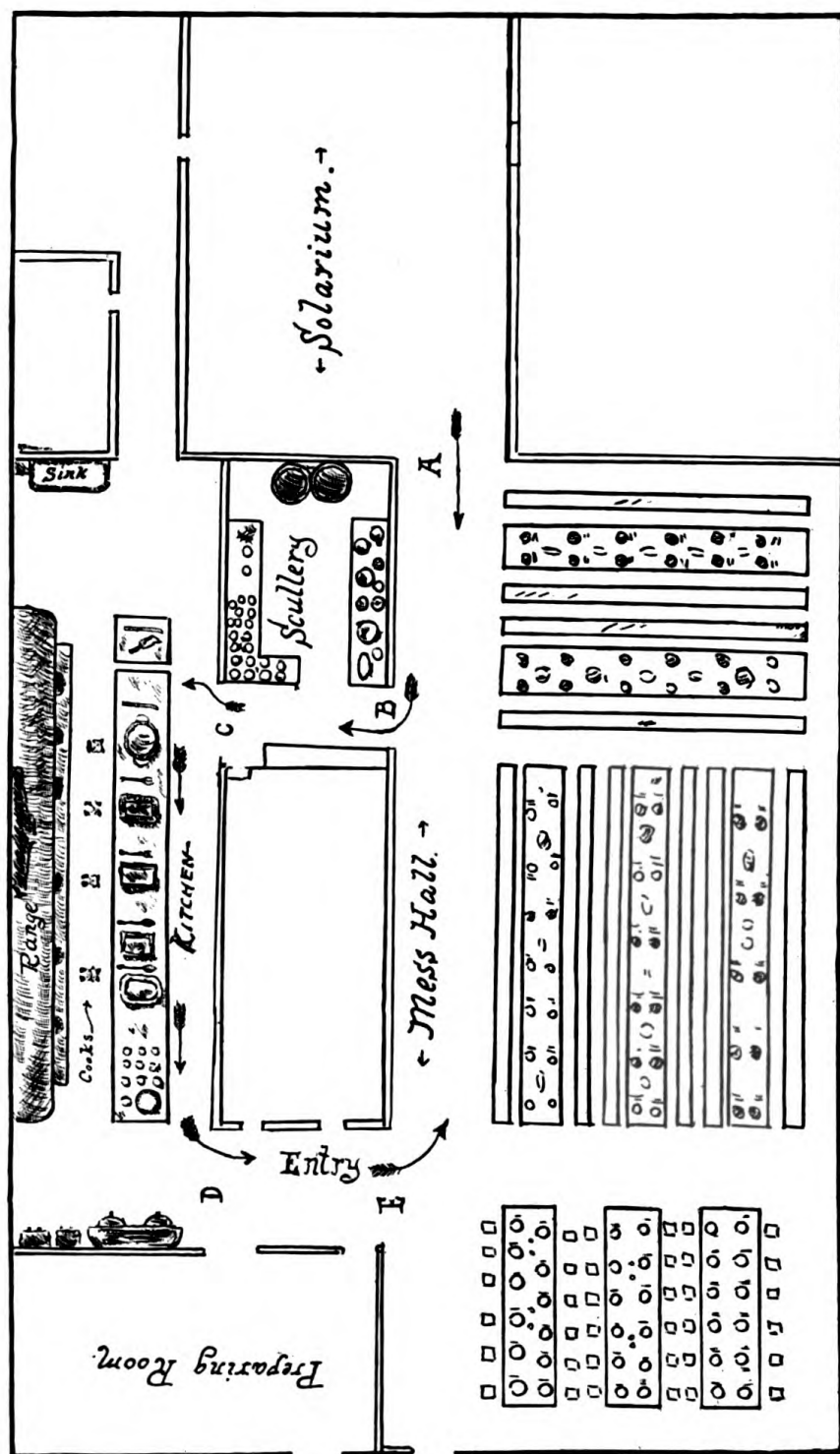
By F. E. SIMMONS, Hospital Steward, United States Navy.

In December last it was decided to try serving meals to the general mess at the Mare Island Hospital by means of a cafeteria method, and after three months' experience it is believed that a brief account of the results attained by this system may prove of interest and possible value. The following decided advantages are noted as a result of this system:

- (a) Increased satisfaction of the men by reason of hotter meals.
- (b) Possibility of expanding menus.
- (c) Economy.

It is believed that the first-mentioned point is the most important one developed. Under the old system of setting the tables, the portioning out by careless or disinterested messmen of the various dishes,





Arrangement of galley and mess hall.

C. F. Streeck.

inspection by the officer of the day, and finally throwing the mess-hall doors open to from 60 to 120 men, it may easily be understood that when the last of these men reached their places they would find the food cold. Those who have tried it will realize the impracticability of placing the principal dishes, such as meats and vegetables, on the general mess tables in large platters or dishes, for it is impossible to overcome the ever-existing tendency of a hungry sailor man to act on the principle of "first come, first served," and the last ones to whom the platters are passed find only the most undesirable portions remaining. The general arrangement of our mess hall, scullery, and kitchen made it easy to provide for a *caf  teria* service. The tables are set by the messmen as to knives, forks, spoons, cups, and bread and butter. When soup is served it is placed on the tables in large tureens, with bowls for same, and the coffee, tea, cocoa, or milk is also put on the tables. The convalescent patients and hospital corpsmen form for mess in the solarium, and upon the ringing of the gong file in through doors A and B, pass through the scullery, where they obtain from the table to their right plates and saucers, the latter for side dishes, salads, etc., through door C into the kitchen, passing by the long table, where they are served the various dishes by the kitchen force, and proceeding back to the mess hall through doors D and E go directly to their places at the tables. The first dish the men come to at the serving table is always the meat; then the potatoes, gravy, and other vegetables, and lastly the dessert. This method gives the diner an opportunity to elect as to whether he wants much or little, or in the case of gravies, sauces, and vegetables he may choose not to have any. It is surprising to learn the number of likes and dislikes in these particulars, and since the establishment of the *caf  teria* service there have frequently been heard from patients expressions of pleasure at not having had a meal spoiled by the presence on their plates of parsnips, onions, tomato sauce, or some other dish which they individually dislike.

Above all, the various dishes are served from large containers which have been kept over the fires or in the ovens until the gong sounded, and the food reaches a man's plate piping hot. As we can serve 20 men a minute, it will readily be seen that it is still good and warm when he gets back to the mess hall and finds his place at the table.

After serving, the left-over portions of the meal are immediately transferred to the range to be kept warm for men who are away on duty.

By means of this service it has been found possible to increase the number of dishes served at a single meal. We find it practicable at

times to serve an additional vegetable or a variety of cold meats, giving the men an opportunity to state their preference.

The menu is posted on a blackboard in the solarium before each meal. This gives the men an opportunity to make up their minds as to what portion of the meal they do not care for.

There can be no question as to the economy resulting from this system. Waste is markedly decreased. To be sure, men frequently are served more than they can eat, even with the *cafeteria* service, but close observation leads us to believe that the amount of food which goes from the plates to the slop cans is materially less than under the old method. At first we experienced a marked increase in left-over material, but as this had never gone to the individual plates it was perfectly good to use for future dishes, and we are learning that we can considerably reduce our orders under the new system.

Owing to the radical changes made for economy in the commissary department of this hospital several months prior to the introduction of the *cafeteria* system, it is impossible to accurately determine the net saving due to this method. The variety and attractiveness of the ration has been materially increased. This opinion is not mine alone, but is shared by the men in general who actually consume the food.

It is also noted that the cost of provisions has increased. In spite of this the following saving has been noted: During the fiscal year 1914, the average cost per ration per diem was \$0.5215. During the months of January and February, 1915, under the *cafeteria* system, the daily ration was reduced to \$0.4256, a net saving of \$0.0959 per ration per diem. The average daily rations issued were over 291, which shows a saving of \$27.92 per diem, or the goodly sum of \$10,190.80 per annum. Approximately one-third of this saving I believe to be directly due to the *cafeteria* system.

MESSING ARRANGEMENTS IN THE UNITED STATES NAVAL HOSPITAL, PHILADELPHIA.

By H. A. DUNN, Surgeon, and P. J. WALDNER, Chief Pharmacist, United States Navy.

It is probably safe to say that in most naval hospitals the general mess hall is given over quite exclusively to the house-diet service for ambulant cases and those convalescents who have made such progress in their recovery as to fit them to compete with their more active shipmates. Special diets have been served almost exclusively in the wards and the sight of men sitting awkwardly in bed or half hanging out of it or sitting on the edge half dressed is familiar to every experienced hospital man. The food thus served is never as

palatable as that which may be offered at a table under careful supervision. Invariably it has to be warmed up in the ward diet kitchens, and warmed-over food has lost its best flavor. In an effort to improve this situation a room has been set apart in this hospital, connected with the main mess hall, where special diets are served. This feature in itself is not altogether new, but the degree to which we have carried it here with such marked success gives it some claim to the attention of those interested in this feature of hospital management. These special tables are under the direct supervision, at each meal, of a member of the Nurse Corps, assisted by a hospital apprentice. The nurse sees that each patient gets exactly the diet prescribed for him sent directly from the main diet kitchen. Every patient who can safely go to table is sent there. We have two tables—one for walking cases and one to which patients in wheel chairs are brought from all parts of the hospital by way of the elevator and moved in their chairs directly up to the table, thus involving no exhausting shifting to another chair. The patients have expressed much pleasure at this arrangement. It offers a form of mild recreation three times a day, and the change of environment and the sociability of the table gives a relish to the food altogether lacking in the bedside service. Moreover ward diets are reduced to the minimum with a resulting betterment of the service to those who must receive their food in bed, and economy in both labor and material is effected.

Venereal cases are all assigned to a table in a separate room off the main mess hall, equipped with apparatus for boiling all their dishes. Their food comes directly from the galley in dishes kept in this room between meals, so that there can be no possibility of mixing mess gear. Aside from the hygienic aspect of this arrangement, it has been found that patients not in the venereal class enjoy a peculiar sense of satisfaction in this assurance that their mess is "clean."

Almost without exception service articles dealing with commissary matters in hospitals lay much stress on the low cost of the daily ration, seemingly losing sight of the importance of efficient service in their aim for cheapness. While, as stated above, considerable economy has been effected by this scheme of segregation, combined with centralization, cheapness has not been the main point strived for; in fact the guiding principle in this institution is good food first, and we get it at reasonable cost by a studied elimination of waste and a careful checking of supplies furnished by contractors.

Assuming that all men in a hospital are more or less sick, anything which can be done to add to their comfort and cheerfulness, such as tablecloths on mess tables, decent mess gear, and mess-hall service, should be considered as material points in proper hospital treatment.

CASTOR OIL. AN ASEPTIC DRESSING ON THE FIELD OF BATTLE.

By A. E. GALLANT, Assistant Surgeon, Medical Reserve Corps, United States Navy.

As is well known, the pus-forming bacteria, especially the staphylococci, streptococci, etc., find their regular habitat on the arms, clothing, and superficial and deep layers of the skin, and thereby render it almost an impossibility to puncture the surface of the body in any part by bayonet or bullet, sword or shrapnel, bolt from the aeroplane above, or nail underfoot, etc., without forcing bacteria into the depths of each and every wound.

Nature, when left to her own devices, stops the bleeding by coagulation, air drying, and scab formation, thereby sealing up the bacteria within the wound, where they find in the blood serum the most appropriate medium upon which to thrive and multiply with marvelous rapidity, and "in dying leave behind them" toxins in the blood of man. If the pus under pressure is not let out, the bacteria may be forced into the blood stream and septicemia result.

How can this unfortunate drying, scabbing, and sealing in of the pyogenic bacteria be avoided or overcome?

As the result of his studies in the use of oily dressings the late Prof. W. W. Van Arsdale determined that in castor oil to which was added 4 or 5 per cent of balsam of Peru we had a dressing which when applied to fresh wounds prevents suppuration, absorption, and infection, and when applied to a suppurating surface quickly and efficiently drains it and promotes rapid healing.

The method of application of this solution as a dressing is very simple. A bunch (or pad) of plain or sterile gauze is spread with this solution over an area somewhat larger than the wound to be dressed. This is most readily accomplished by the use of a large (2 or 3 inch) varnish brush dipped in the solution. The amount applied is graduated according to the size of the dressing and the period during which the dressing is to remain in place. Generally speaking, it is sufficient to have the solution permeate the first four or six layers of gauze. The gauze is now simply laid on the wound, so that the oil comes in contact with it. then a protective layer of rubber tissue (paraffin paper) or oiled paper (oiled silk or muslin) is spread over all and the bandage applied. I have used this simple dressing in many thousands of cases during the last six years and have found it very satisfactory for all sorts of granulating wounds, especially contused and lacerated of every description, as well as for burns, furuncles, incised abscesses, etc. (Van Arsdale: New York Med. Jour., July 29, 1893, 115-118.)

Castor oil when applied to absorbent gauze is taken up by the cotton fiber; the wound secretions by capillary attraction are drawn up into the interstices.

The castor-oil dressing does not dry, does not form a scab in the gauze, does not become glued to the wound, and can therefore be easily removed painlessly, bloodlessly, and without injury to the wound.

The castor-oil dressing applied to fresh wounds, by continuously absorbing all secretion, prevents bacterial proliferation and toxin formation; prevents pus accumulation and absorption; and precludes septic infection, as shown by the absence of fever, and locally any signs of inflammation.

When the castor-oil dressing is used on suppurating wounds, open abscesses, ulcers, etc., it absorbs the pus most thoroughly; pain, redness, and heat quickly subside, and at the next dressing, some three days later, the absence of these symptoms and the clean condition of the wound is most gratifying. It will also be noticed that the cavity has contracted, the drainage is free, the opening is still open, and that healing is rapidly taking place from the bottom up.

As illustrating the numerous varieties of conditions to which the castor-oil dressing has been applied, we summarize the cases (described in a paper by the writer), dressed during the years 1887 to 1896, in the service of Prof. Van Arsdale, at the Good Samaritan Dispensary, New York (Ann. Surg., September, 1897): Wounds, 6,428; burns and scalds, 2,722; abscesses, 9,925; infections, 3,229; ulcers, 2,772; miscellaneous conditions, 3,944; in all, 29,020 cases.

It is of special interest to note that the 19 cases of bullet wounds, with or without extraction of the bullet, healed promptly.

Animal bites (by cat, 5; horse, 7; rat, 7; human, 8; dog, 130) were not cauterized but only drained by the same method.

As a ready-to-use first-aid packet in the home or during peace or war we would suggest the following balsam-oil packet:

1. A pad of sterile gauze (8 layers 4 by 4 inches) saturated with balsam-oil mixture, wrapped in paraffin paper, inclosed in a metal container.

2. One yard square of sterile gauze, folded to $4\frac{1}{2}$ by $4\frac{1}{2}$ inches, inclosed in paraffin paper.

3. One or two triangular bandages, 8 by 16, or a 2-inch roll gauze bandage.

4. One yard (or more) one-fourth-inch adhesive plaster tape.

The whole to be inserted in an oil muslin envelope secured by one or two glove fasteners.

Put up in this manner the packet would be inexpensive, small, compact, containing nothing breakable, moisture proof, and easily carried in the pocket or kit.

The small percentage of balsam of Peru or oil of eucalyptus would keep the oil sweet, and when in use make a bland, nonirritating, non-poisonous, nontoxic dressing, extremely simple of application, viz: (a) Lay the oil-soaked gauze over the wound; (b) cover it with the dry gauze; (c) cover the gauze with the paraffin paper in which it had been wrapped; (d) secure the dressing in place by a bandage, and spiral of adhesive tape, to prevent the dressing from slipping.

No attempt should be made to wash, irrigate, or cleanse the wound other than to wipe off the excess of blood from the skin.

Under the castor-oil dressing, ragged and dirty as it may be, fresh wounds do not suppurate, even when the dressing is not renewed for three or four days; as a matter of experience, convenience, and economy of time and dressings, healing takes place more quickly when the dressing is not replaced oftener than once in three days.

During the past 23 years we have used cold pressed castor oil with or without the balsam of Peru or oil of eucalyptus in dispensary, hospital, and private practice, replacing all other dressings, in all but a few exceptional cases which may require the addition of powder, etc., as calomel, in chancroids, iodoform in tubercular ulcer, etc.

CLINICAL NOTES.

A CASE OF FRACTURE-DISLOCATION OF SPINE. LAMINECTOMY.

By R. E. LEDBETTER, Surgeon, and H. PRIEST, Assistant Surgeon, United States Navy.

M—, ordinary seaman, while standing in a semierect position in the hold of the collier *Brutus*, was struck in the dorsal region by a filled coal bag weighing some 600 pounds. The bag was swinging free and struck the patient diagonally. When first seen by the medical officer, about 10 minutes later, there was complete motor and sensory paralysis below seat of injury, all reflexes were abolished, and priapism was present, which persisted for several hours after the accident.

Examination of seat of injury disclosed considerable swelling and, as far as could be determined, there was a fracture of the spine of the eleventh dorsal vertebra. There was a very little shock and some pain was complained of at seat of injury.

An exploratory laminectomy was decided upon, and patient after receiving the usual hypodermic of morphin and atropin was placed prone on the operating table, with a sandbag under lower ribs. Ether anesthesia. Iodin method of skin disinfection. An 8-inch incision, the middle of which corresponded to the seat of the injury, was made down to the spinous processes. The erector spinæ muscles were badly contused and distended with blood. The spinous processes of the exposed vertebræ were dissected out, and the following conditions were found to exist, viz: The spinous process of the eleventh dorsal was fractured, spinous process of the tenth dorsal was comminuted, and several large masses of bone were broken off from the body of this vertebra, which was found to be dislocated to the left about 45° from normal. The spinous and transverse processes of the tenth, eleventh, and twelfth dorsal vertebræ, as well as all detached fragments of bone, were removed with rongeur forceps and the cord was exposed for a space of about 2 inches. The dura was incised and there was a fairly free hemorrhage from the cord, which was found to be macerated and pulpified. Numerous detached pieces of the cord were removed through the dural opening. Owing to the extensive laceration, no attempt was made to suture the cord. An opening was left in the dura for drainage. An effort was made to correct the dislocation by gentle manipulation, which was partially successful.

A CASE OF MALIGNANT ENDOCARDITIS (GONORRHEAL).

By M. E. HIGGINS, Passed Assistant Surgeon, United States Navy.

X—, fireman, first class, age 26. He had gonorrhea with epididymitis during January and February, 1911. He was well until January 13, 1915, when he was admitted with a fresh attack of gonorrhea. On February 8 the diagnosis was changed to gonococcus infection of the joints, and on February 24 he was transferred to the *Solace*. The joints involved were the right wrist and elbow. When admitted the right wrist was slightly swollen, and he complained of some pain about the right shoulder. Temperature, 100.8° F.; pulse, 96; respirations, 20. An examination of the heart was negative. The urine was negative. Within 10 days the joint symptoms had cleared up entirely, but the temperature remained elevated—100° to 104°. Signs of a septic process appeared—severe sweats, pallor, and emaciation. Dyspnea also developed. There was a moderate leukocytosis (11,000). On March 9 an examination of the heart showed a well-marked to-and-fro murmur at the aortic area. The systolic murmur was the more pronounced. The heart's action became gradually weaker and dyspnea increased. On March 17 dyspnea was urgent and dullness was present over the bases of both lungs. Pulse, 130; respirations, 54; temperature, 100°. The action of the heart was tumultuous and no murmur could be definitely heard. Death occurred March 18.

A partial autopsy was held. Both pleural cavities contained a considerable quantity of clear fluid. The heart was slightly enlarged; weight, 346 grams. The pericardium contained 50 c. c. of thin purulent fluid. The heart valves were normal with the exception of the aortic. Two of the segments of this valve were practically replaced by verrucous granulations growing into the free heart cavity. Ulceration with perforation had occurred in both segments. Cover-slip smears from the vegetations showed a Gram negative diplococcus.

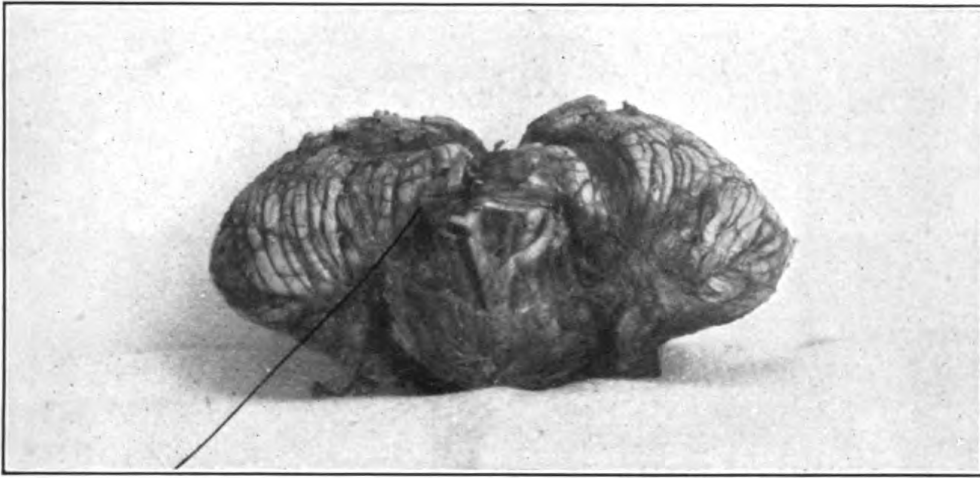
While it is well recognized that the gonococcus, either alone or in combination with the more common pyogenic organisms, often produces endocarditis of a peculiar malignancy, the above case illustrates how rapidly death may follow the onset of the cardiac symptoms. In this case the perforation of two segments of the valve undoubtedly produced an acute aortic insufficiency against which the heart could not possibly labor very long.

A POSSIBLE NEW X-RAY SIGN OF TUBERCULOSIS.

By E. THOMPSON, Surgeon, and H. L. GALL, Hospital Steward, United States Navy.

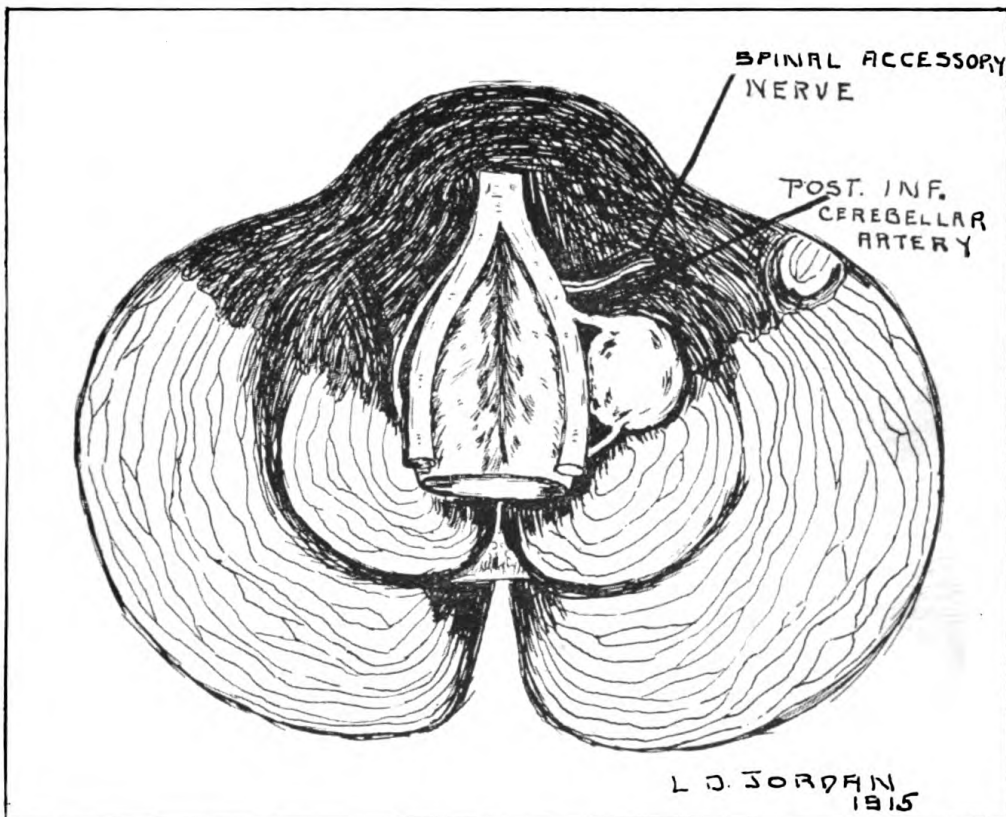
For the past year most of the patients who came to the Naval Hospital, Washington, D. C., with a diagnosis of tuberculosis have had various roentgenological examinations made. Plates have been made

Woods—Aneurysm of Cerebellar.

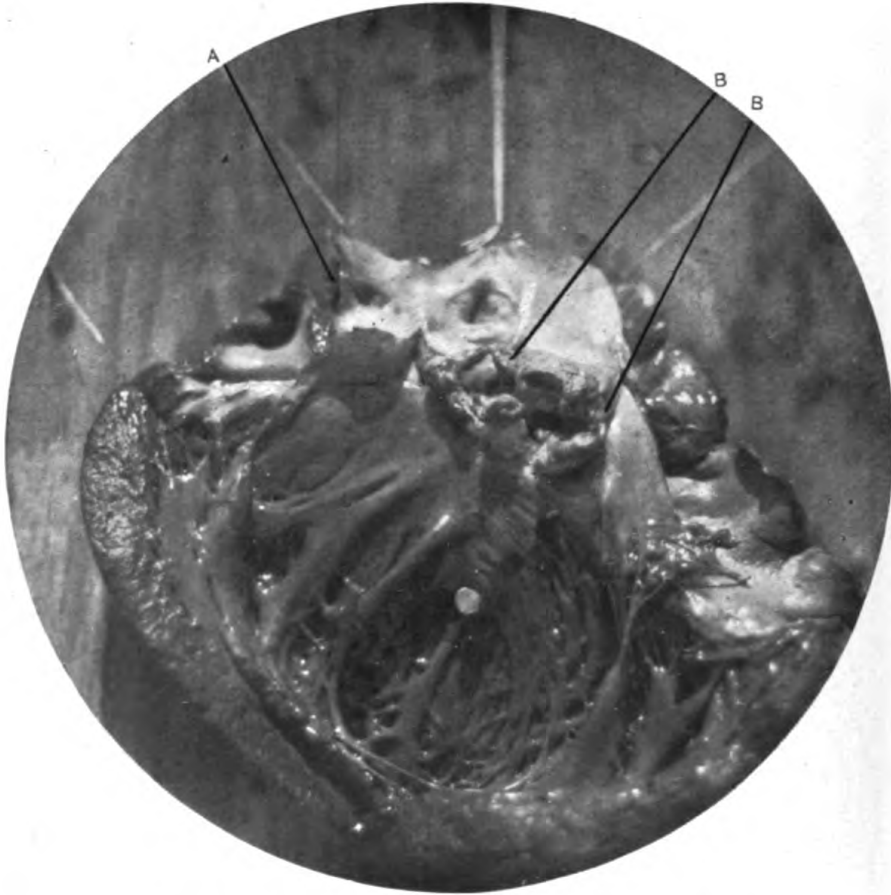


A

A—Aneurysm of posterior inferior cerebellar artery.



Higgins—Malignant Endocarditis.



A—Normal segment. B—Segments showing perforation.

436-2

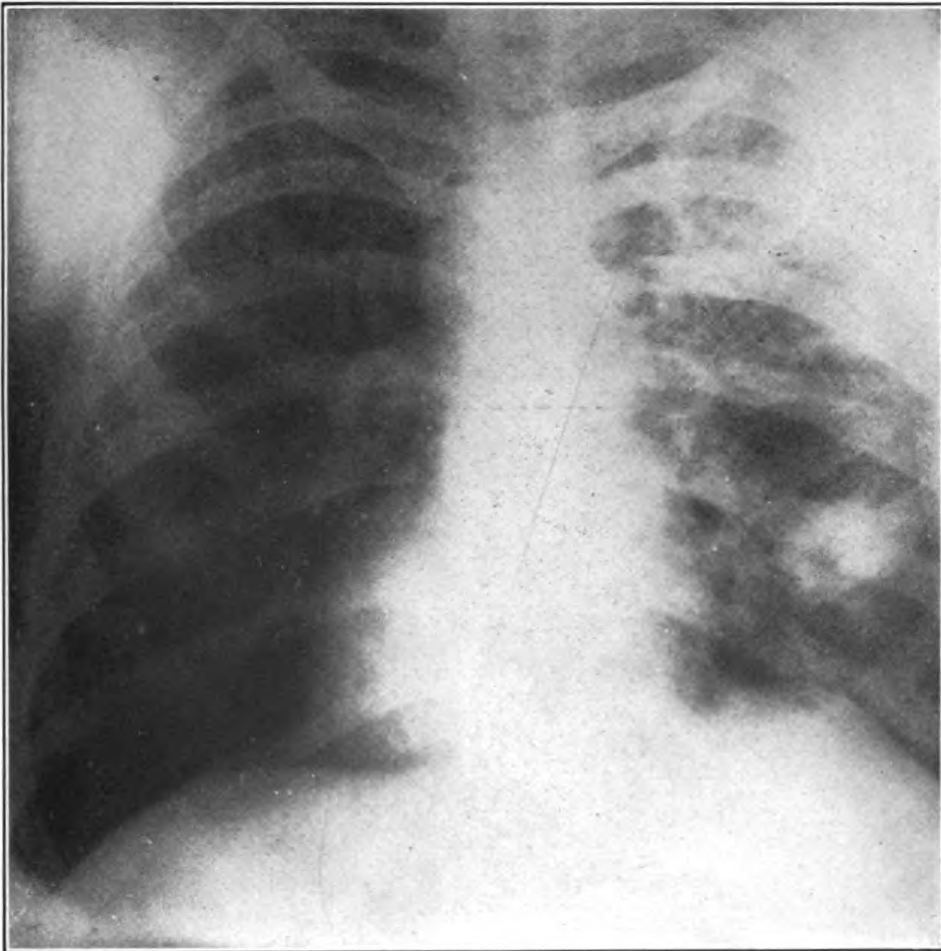


Fig. 1.—Marked elevation of diaphragm under an old lung abscess scar.

436—3

Thompson and Gall—Tuberculosis.

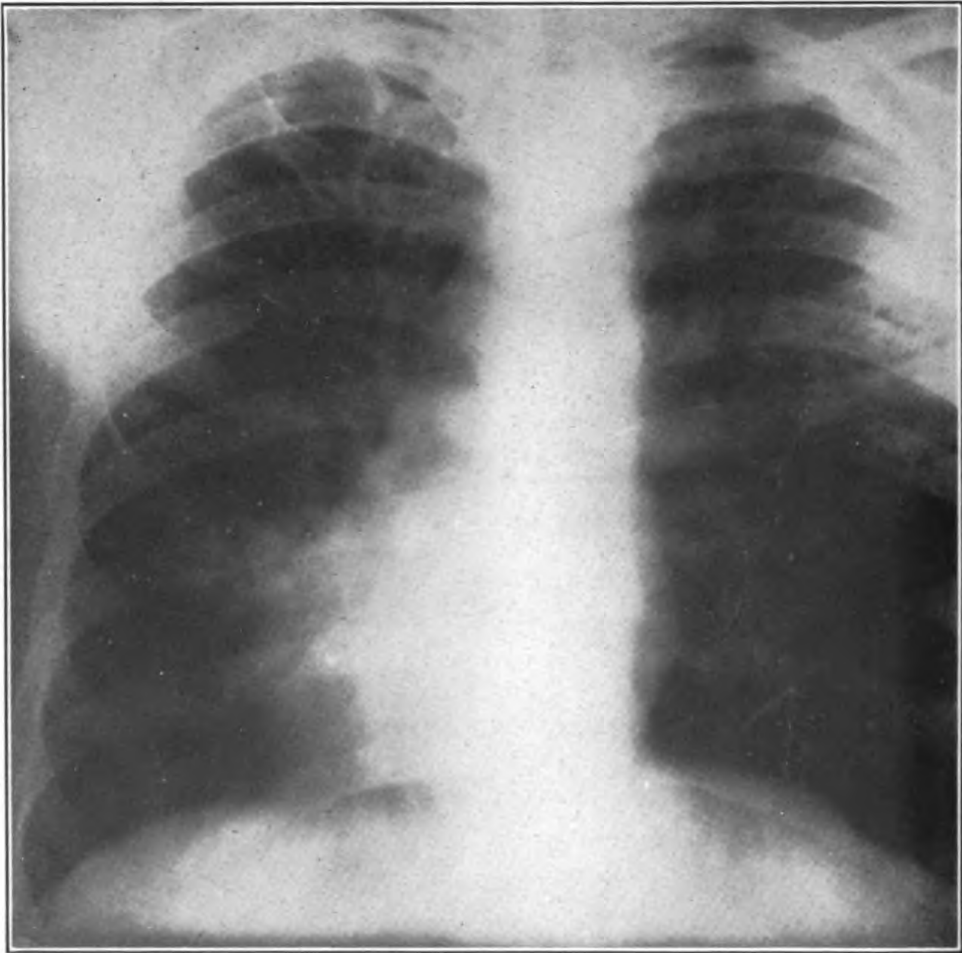


Fig. 2.—Irregular diaphragm line associated with tuberculosis.

436-4

Thompson and Gall—Tuberculosis.

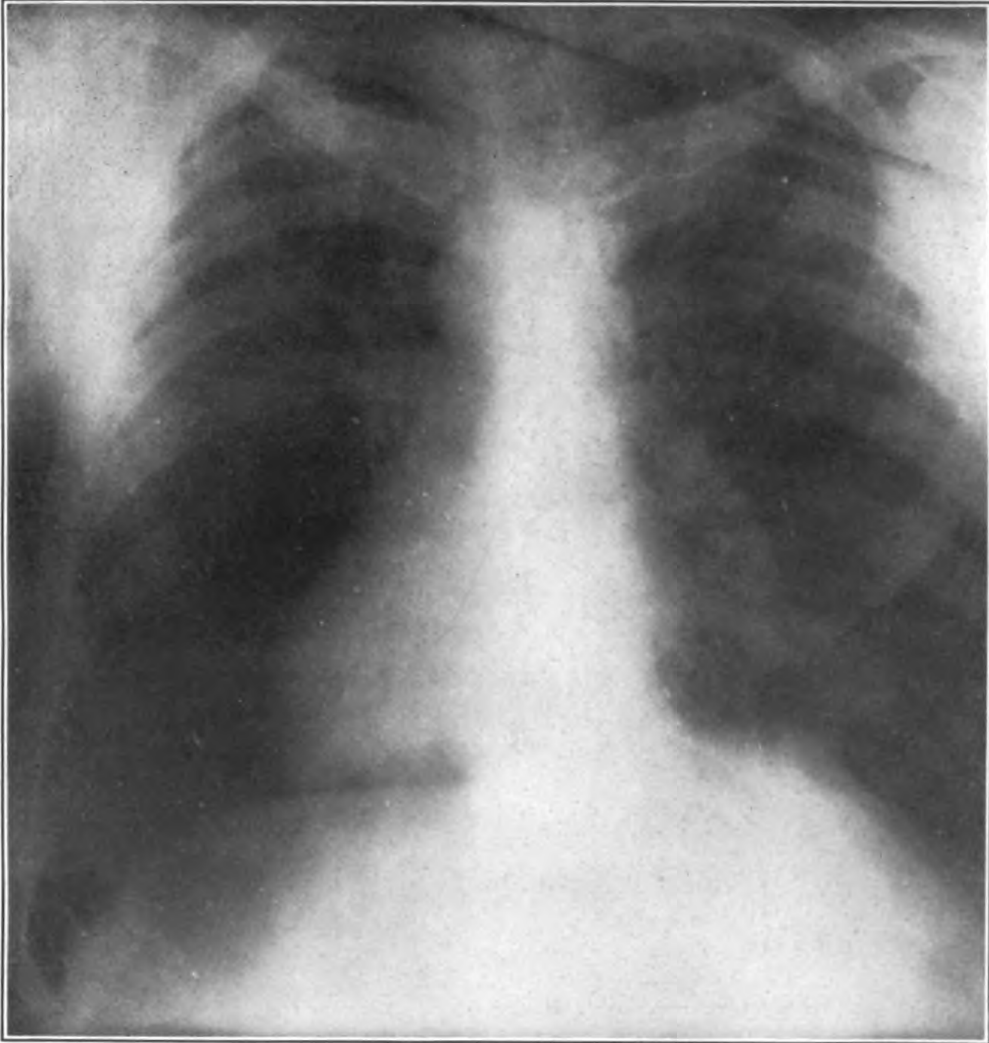


Fig. 3.—Large hump in diaphragm under a local tubercular focus.

436-5

under various circumstances and fluoroscopic examinations undertaken. The purpose of the work has been to see how far the cases check up with appearances already described, such as the Williams's sign, the changes in the angle of the long diameter of the heart in its relation to the vertical line of the spinal column, etc.

A new condition was observed which may be of some value in the diagnosis of local tubercular foci in the lungs. This condition consists of an irregularity in the rounded outline of the diaphragm line. Under normal conditions the diaphragm is sharply outlined as a smooth line of easy curves. The difference in density of the liver and lungs makes it very easy to observe any break or irregularity in the contour of the line. When viewed with the fluoroscope the diaphragm is seen making its excursions up and down and always preserving its general contour whatever it may be.

In a great number of cases of pulmonary tuberculosis the plates do not show a smooth outline of the diaphragm. Irregularities are seen and large humps sometimes occur. These elevations are always above the general line of the diaphragm and are at the expense of the pulmonary side. In other words, it appeared that there might be a place to fill in to equalize the tension, and the diaphragm had bulged up to do it.

The intrathoracic pressure is, of course, always negative to the extent of about four mm. of mercury. There is also always a positive pressure on the abdominal side of the diaphragm of several grams to the square cm. and it is reasonable to suppose that any diminution of the lung volume would be replaced by the abdominal contents as long as the difference of pressure on the two sides of the diaphragm was so great. Nature would abhor a tendency to a vacuum here as much as anywhere else.

The presence of a hump on the diaphragm is well shown in Fig. 1. This case has a history of pneumonia of the right lung occurring several years ago. There was delayed resolution and abscess formation. At the present time he has a pulmonary tuberculosis. The case is rather advanced and the signature of the disease on the plate is quite characteristic. The plate is presented, however, to show the cicatrix of the old abscess in the lower part of the right lung and the large elevation of the diaphragm pointing to it. The plate seems clear, as far as appearances are concerned, and the interpretation made above is offered. The presence of pleuritic adhesions would not account for the bulge in the diaphragm unless there was a contraction of the lung tissue. It appears that there are only two possible explanations, viz: A local decrease in lung volume above or a large local increase in pressure below. A subphrenic abscess or liver abscess would, in all probability, give the appearance shown in the plate. In this case, however, the history is negative as to any

abscesses below the diaphragm and positive as to one above, with the added evidence of a large contracted scar with the telltale elevation of the diaphragm directly beneath it.

This plate is a very marked one and is submitted to show what is necessary to look for and observe. Most of the plates are not so clear and the irregularities in the outline of the diaphragm are not so marked. But in most cases of tuberculosis the sign can be found at some stage of the respiratory cycle.

Irregularity of the diaphragm has been noted at various times and attributed to the presence of adhesions. True adhesions can be seen by careful technic with a soft tube. The diaphragm will have a slightly spattered appearance similar to the effect produced when a viscid body is touched (such as wet paint). The tacky substance will adhere and then break, causing a slight point to remain. In all cases of simple adhesions the contour of the diaphragm is not disturbed.

Fig. 2 is a photograph of the lung of a case of tuberculosis. The diagnosis was positive clinically and confirmed by sputum findings. The left lung has extensive signs of recent infection. At the base of the right lung evidences were found of an older stage of the disease, and contraction had probably taken place. The irregularity in the outline of the diaphragm is seen, and it corresponds to the location of the tuberculosis in the lung.

This plate probably shows that the sign about which we are speaking may not be of great value in the earliest diagnosis of tuberculosis, as some contraction of the lung must take place before the sign appears. We have not seen it in cases of fibrous tuberculosis. It may be that the contraction of the lung is so general that there is no local disturbance of pressure and the diaphragm merely rises to a new permanent level keeping the regular contour.

Fig. 3 was taken of a case of tuberculosis where the disease seemed limited to the bronchial glands and the base of the right lung. The hump on the diaphragm is large and points directly at the local mottled condition of the lung, which indicates the location of the tubercular focus.

A CASE OF PURPURA HEMORRHAGICA (?) WITH MARKED LEUKOPENIA.

By W. L. MANN, Jr., Passed Assistant Surgeon, United States Navy.

D—, chief carpenter's mate, age 51; previous service, 16 years. History of malaria and tendency to chronic alcoholism; otherwise his previous health has been excellent.

Present illness: On Jan. 3, 1915, at Hankow, China, while at work, patient was suddenly seized with severe rigors. Vomiting began

early, at first consisting of food, later of bile and mucus, followed by a few clots of blood. Temperature was subnormal, but later rose to 102° F. Blood examination was negative for malaria. Patient continuously expectorated bloody and frothy mucus, alkaline in reaction.

January 5, 1915: Bleeding from gums present. Patient complains of excessive and constant thirst. Temperature 100 to 102° F. Body and extremities are irregularly covered with petechial spots of various sizes which are more numerous over chest. Red-blood cells, 5,312,000 per c. mm.; white-blood cells, 610 per c. mm. Differential count: Polynuclears, 8.4 per cent; mononuclears, 84.3 per cent; eosinophiles, 7.3 per cent; hemoglobin, 100+ per cent; hemoglobin index, 1.00—.

Coagulation time, 17 to 20 minutes.

An endeavor was made to eliminate all errors in the above low leukocyte count by taking the average of several results of two observers and checking their methods by the examination of blood from a normal individual. Some of the counts were as low as 300 and 400 per c. mm.

January 7, 1915: A large "black and blue" suggillation covers the entire external, anterior, and part of the internal aspect of thigh extending from hip joint to knee. Marked epistaxis has been present for past 24 hours. The gums are tender and swollen and are covered on their oral surface with small white patches. Large numbers of streptothrix and mycelial threads are present in these patches. Leukocytes, 1,560 per c. mm.; coagulation time, 7 minutes.

January 8, 1915: Patient feels better. Temperature normal. No hemorrhages present.

January 10, 1915: Patient is up and about. He is a little weak; otherwise is normal. The petechial rash has almost disappeared; ecchymosis on thigh still present.

February 6, 1915: White-blood cells, 5,200 per c. mm.; red-blood cells, 5,600,000 per c. mm.; hemoglobin test, 85 per cent; color index, 0.7+; large lymphocytes, 8 per cent; small lymphocytes, 10.5 per cent; polynuclears, 58 per cent; mononuclears, 7.5 per cent; eosinophiles, 5 per cent; basophiles, 0.5 per cent; transitionals, 5.5 per cent.

On two occasions after prolonged search a rapidly motile micro-organism, apparently some flagellated hematozoon, was discovered in fresh-blood specimens. It was impossible to locate these organisms in a stained specimen. The incompleteness of the above observation prevents the acceptance of the findings as of any scientific value; it is merely reported as a suggestion that might serve as an aid to some observer who may be more fortunate in the isolation and study of this organism. This organism did not correspond in morphology to the parasite of malaria.

REPORT OF TWENTY-EIGHT CASES OF PYORRHEA ALVEOLARIS TREATED WITH EMETIN HYDROCHLORID.

By A. H. ALLEN, Passed Assistant Surgeon, United States Navy.

From a review of the numerous recent articles on pyorrhea alveolaris it seems to be established that the *Endameba buccalis* is found in practically all cases of the disease. Whether or not this organism is the specific exciting cause of the disease has not been thoroughly worked out, as no observer has carried out Koch's postulates.

There are such enormous numbers of other micro-organisms found in smears taken from infected mouths that it seems certain that the ordinary pyogenic bacteria play an important rôle in producing the lesions and continuing the destructive process inaugurated by the endameba, assuming that the ameba is the specific causative agent. This being granted it is only logical to believe that the secondary infection is as important as the primary one, and that treatment should be directed along the lines of first removing the exciting cause; second, destroying as far as possible the secondary agents; and, third, doing the mechanical work on the teeth which is necessary to eliminate future foci of infection.

In carrying out the above principles the method given by Bass and Johns was followed in 28 cases.

A smear was taken from the pus pockets, getting as near the bottoms as possible, and both fresh and stained specimens examined. In every case referred by the dental officer, Acting Assistant Dental Surgeon J. V. McAlpin, United States Navy, with a clinical diagnosis of Riggs's disease, both motile and stained amebas were found.

A hypodermic injection of emetin hydrochlorid, one-half grain, was given daily in the arm for six days. During this period the mouth was treated by Dr. McAlpin, who extracted the hopeless teeth and cleaned and scaled the others. As it was believed that we were dealing with a mixed infection, active antiseptics were used locally by the dentist in all cases. These included various antiseptic alkaline mouth washes and the local application of trichlorid acetic acid or tincture of iodine to the pus pockets.

At the end of six days more smears were examined, and if amebas were still present three more hypodermic injections of emetin were given. Nine injections has been the greatest number that have been given. In three cases of women, owing to the soreness of the arm resulting from the daily use of the hypodermic syringe, the injections were alternated with the administration of two Alcresta ipecac tablets three times daily.

This work was started in January, 1915, and at the time of writing has covered a period of five months. The following table gives the results:

CLINICAL CONDITION.	MICROSCOPICAL EXAMINATION.
Cured ----- 10=35 per cent plus.	Ameba absent --- 10=35 per cent plus.
Improved ----- 12=42 per cent plus.	Ameba absent --- 12=42 per cent plus.
No change ----- 6=21 per cent.	{ Ameba absent --- 4=14 per cent.
	{ Ameba present --- 2= 7 per cent.

From these results the use of emetin in conjunction with local measures will be seen to have been beneficial in 77 per cent of the cases, although an actual cure was obtained in only 35 per cent. This does not coincide with the reports of some enthusiastic authors, yet does indicate that in emetin we have a valuable agent in the treatment of pyorrhea.

INTRAVENOUS INJECTION OF NEOSALVARSAN IN CONCENTRATED SOLUTION.

By C. B. CAMERER, Passed Assistant Surgeon, United States Navy.

Under this heading Bvt. Col. T. W. Gibbard, K. H. S., R. A. M. C., describes a simple and convenient method of administering neosalvarsan in concentration of 10 c. c. of distilled water. This measure has been employed by me in the administration of several doses of neosalvarsan, and with most gratifying results. The ease, expedition, and simplicity of Col. Gibbard's method will undoubtedly at once appeal to the majority of medical officers, and its feasibility on board even the smallest of cruising ships becomes at once apparent.

I give below his technic, taken from the Journal of the Royal Army Medical Corps for November, 1914:

Apparatus, etc., required.—(1) Test tube; (2) a 2-ounce Jena glass beaker (or a porcelain crucible) marked at 10 c. c.; (3) a 10 c. c. syringe with needle; (4) solution of iodine in chloroform (1 in 15); (5) tourniquet; (6) gauze and collodion.

As regards the above, it may be remarked that a small glass beaker in which to dissolve the powder is preferable to a porcelain crucible, the former rendering it easier to see that the solution is clear. A Record syringe is suitable. The 1½-inch platino-iridium needle, supplied with the all-glass syringe used for intramuscular injections of mercury, is preferable to that supplied with the Record syringe.

Preparation of apparatus and solutions.—1. Sterilize the syringe by boiling and place it in sterile water to cool, the metal portion retains the heat for some minutes. When there are several cases for injection, use two syringes, one being boiled and cooled while the other is in use.

2. Sterilize the needle by standing in absolute alcohol; remove from the alcohol and place in sterile cold water ready for use. If sterilized by boiling, the point will require frequent attention.

3. Boil a test-tube of tap water and cool it to below 70° F. When cool pour this into the Jena glass beaker up to the 10 c. c. mark.

4. Open a capsule containing neosalvarsan, slowly pour the powder into the water, and dissolve it completely, using the small glass rod provided with each ampoule. The rod should previously be sterilized by boiling.

Technic of injection.—Draw the solution of neosalvarsan into the syringe with the needle attached, expel air, detach the needle, and place it in sterile water.

The patient lies on an operating table or in bed. A tourniquet is applied round the upper arm, the veins distended, the fist being opened and closed firmly several times. A prominent vein is painted with iodine solution; the skin over the vein is picked up, the needle inserted into the tissue between it and the vein, and then into the vein. Some push the needle through the skin directly into the vein; the procedure described above is, however, that which I have found the best.

When the flow of venous blood shows that the needle is in the vein, the syringe containing the solution of neosalvarsan is attached, the tourniquet removed, and the patient directed to quietly open his hand. The solution is then slowly injected, care being taken not to displace the needle from the vein. While injecting the fluid watch carefully for infiltration; should this occur, stop at once, remove the needle, seal the vein by pressure, and put the needle into another vein. On completion of the injection the vein is sealed by pressure, and collodion and gauze are applied.

The above is the procedure used when the veins are small and which I advise beginners to adopt in order to avoid infiltrates. In the case of good veins the needle may be inserted while attached to the syringe; when this is done it is advisable to momentarily detach the syringe to see that venous blood is flowing, then attach it again and complete the injection. In some cases the fact that the needle is in the vein will be obvious by the back flow of blood into the syringe. With experience the operator will seldom find it necessary to detach the syringe.

In no case of my series did any untoward symptoms develop, temperatures running below 99° F. in all instances. The above procedure is now employed as the routine method of administering neosalvarsan at the navy yard, Mare Island, Cal.

TRANSLATIONS.

CATHETERIZATION OF THE EJACULATORY CANALS.¹

Translated by R. A. BACHMANN, Surgeon, United States Navy.

In considering the astonishing ease with which, thanks to the perfection of modern technic, catheterization of the ureters is accomplished, it is astonishing that until now catheterization of the ejaculatory canals has not been effected and that the literature is almost mute on this subject.

Klotz, of New York, in 1905 made several attempts. He constructed a small syringe armed with a fine canula, which he introduced into the mouths of the ejaculatory ducts to inject solutions into the seminal vesicles, but he did not obtain good results as his injections were followed by epididymitis.

This attempt of Klotz is nevertheless interesting, for it marks a new era in pointing out an easy access to the dark and mysterious passages of the seminal vesicles. It is in the perfection of urethroscopic technic that one must look for the solution of the question.

With that henceforth one may claim that the catheterization of the ejaculatory canals is not only possible but actually indicated in certain cases.

Anatomical considerations.—Catheterization of the ejaculatory canals is perfectly possible, but if one takes as a starting point investigations on the cadaver one might be easily disheartened by such a proceeding, for the verumontanum and ejaculatory ducts are certainly much more difficult to find in the cadaver than in the living subject. That is perfectly evident, because the verumontanum is an organ distinctly erectile, normally vascular, and full of blood. On the cadaver, therefore, its dimensions are greatly reduced, making the orifices which are present more difficult to see.

A series of investigations was made by Dr. Pelletier and myself upon the cadaver and the living subject by means of the urethroscope to ascertain the exact position of the ejaculatory canals relative to the prostatic utricle and the verumontanum.

The result of our researches differed notably from the accepted anatomical description. The classical authors describe the orifices of the ejaculatory canals as situated most often laterally upon the cheeks of the verumontanum and placed symmetrically, in relation

¹ By Dr. George Luys (Paris), with permission of the author. Illustrations by the translator.

to the utricle (Fig. I, A and B). Accordingly the verumontanum should present three orifices—a median one (the prostatic utricle) and two lateral ones corresponding each to the orifices of the ejaculatory canals.

This classical description is far from agreeing with the great majority of cases. On 11 cadavers examined it was found only three times. Indeed, one may meet those rare cases in which it is impossible to see any orifice at all, but these almost always correspond to a pathological condition.

A second arrangement, the most frequent, is one in which the utricle is median and the openings of the ejaculatory canals are placed upon the lips of the utricle. On the 11 cadavers examined this arrangement was found seven times (Fig. II, A and B).

A third class is that in which the median prostatic utricle does not exist and the two ejaculatory canals open laterally on the sides of the verumontanum. This is the "diver's helmet" appearance described by me before, and in this condition the orifices of the ejaculatory canals are usually symmetric to the median line, but there also exist cases in which the two orifices are not in the same horizontal plane, but one is higher than the other.

Often the ejaculatory canals are absolutely invisible. A median utricle only exists, and it is only by incising it freely that the two orifices of the ejaculatory canals are exposed well within its vestibule. This was found once in the 11 cases (Fig. III, A and B).

Finally, there occur those rare instances where, through cauterization, whether by silver nitrate or especially the galvano-cautery, the verumontanum is destroyed. In such cases even the sides of the organ disappear, and above them nothing remains save the two ejaculatory canals, joined together like two guns of a turret.

In résumé, there are two principal types: In the most frequent one the ejaculatory canals open on the lips of the utricle itself; in the other the classic description is confirmed.

In passing a catheter on the cadaver one fact is demonstrated, that the catheter never enters the vas deferens, but always the seminal vesicle. This has its importance, since it assures the direct drainage of the seminal vesicles.

INDICATIONS FOR CATHETERIZATION.—Catheterization of the ejaculatory canals is positively indicated in all ejaculatory troubles and more generally in all cases of chronic vesiculitis. In truth, catheterization should be an indispensable adjunct to the treatment of vesiculitis, for the infected vesicles have every need of attention from one end to the other; that is to say, while their bodies require massage their canals also require dilatation, the second act being made necessary by the first to insure proper expressing and emptying of the vesicles.

toned metal probe and found that it entered the orifice with the greatest ease. The probe being slightly conical was arrested at first, then penetrated to the extent of about a centimeter and a half.

Immediately after the catheterization the bladder was filled with a solution of oxycyanid of mercury, the left seminal vesicle was massaged, and, to my great astonishment, I discovered that not only was this maneuver almost painless but also that great, purulent clots dropped into the glass held beneath the meatus. No previous discharge had ever produced such an evacuation. No local reaction followed; the epididymitis subsided; the urine became clear, and that permanently, for nine months later the patient was examined and found in a satisfactory condition, save that he still had phosphuria.

It seems, then, well demonstrated, after this testimony, that catheterization of the ureters can and should be advised when the canals are stenosed and oppose a free and normal evacuation of the seminal vesicles. Catheterization of the ejaculatory canals has also given the happiest results in cases of impaired ejaculation, whether painful, retarded, weak, or bloody.

I had under care a confrère, who for years was in the pitiable condition I have emphasized above and who had become completely neurasthenic because of pains which he experienced after each sexual relation. This patient had a chronic, well-marked posterior urethritis, accompanied as always with a frank vesiculitis. The treatment I applied in this case was primary dilatation of the urethra, then cleansing of the verumontanum, which presented several small polyps and vegetations, which were burnt with the galvanocautery, and finally the treatment terminated by catheterization and dilatation of the ejaculatory ducts. This intervention alone relieved the vague but constant pains that had rendered the patient's life insupportable.

In this particular case the condition was certainly one of stenosis of the canals, for while the smallest metallic sounds passed easily enough into the ejaculatory canals, those slightly larger required severer manipulation, and the same sensation was present that one receives when dealing with a stricture of the urethra.

At these times the ejaculatory symptoms are less marked, yet they exist, and simple dilatation causes them to disappear.

I remember a patient in whom three or four simple dilatations were effective, and after the treatment he declared he had been given new youth. In other cases painful intercourse is relieved and a fancied impotence abolished. And, finally, without being able to explain this satisfactorily, I have noted nodular and indurated cases of epididymitis disappear under the influence of dilatation of the canals. Without doubt the good effect must be produced by the improved drainage.

To sum up this study, one is justified in concluding that catheterization of the ejaculatory canals should be made use of in a routine manner, and that if performed under favorable circumstances not the slightest accident should be produced. It can be said that catheterization of the ejaculatory canals constitutes one of the most brilliant conquests of modern urethroscopy.

HOSPITAL SHIPS.¹

Translated by S. WIERZBICKI, Pharmacist, United States Navy.

Since efficiency on a man-of-war is hampered by the sick, it is easily seen that the aim of the fighting ship has always been to get rid of its sick and wounded, as these are a hindrance in action. This led at first to the brutal practice of throwing the dead overboard, as the fighting man was affected by the sight of the dead and dying, and later to the thought of bringing the sick and wounded under more favorable conditions than those to be found aboard a fighting ship. This idea was the beginning of the hospital ship. We can trace hospital ships back into the seventeenth century, although they served only for the removal of the sick and wounded after action and had nothing else in common with the present hospital ship. Much later came the hospital ship, with equipment designed for the care of sick.

Our hospital ships, on account of their different spheres of action, have to be divided into two classes—the auxiliary hospital ships and the hospital ships proper.

For auxiliary hospital ships small steamers have been utilized, which are easily managed and can be used not only in receiving sick from the ships but also for either receipt or discharge of patients directly from or to docks. Suitable heating, ventilating, and lighting facilities are a foregone conclusion. The personnel and equipment of these ships are somewhat meager—two medical officers—since the stay of patients is only short, limited to the time necessary for transfer to permanent quarters. Bed accommodations on these ships are provided for from 50 to 100 persons.

The hospital ships proper are vessels of from 5,000 to 6,000 tons displacement. They are good sea boats, have suitable speed to follow

¹ Dr. Weber, Medical Department, Imperial German Navy; *Die Woche*, Jan. 9, 1915. Illustrations by Otto Reetz. The German navy, as will be seen from this article, was not in possession of any hospital ships at the beginning of hostilities, but had with remarkable forethought plans and equipment ready for the conversion of certain already picked ships into hospital ships, and therefore the transformation of these ships for the care and transportation of sick took but comparatively little time. While such a procedure worked very well in Germany, where everything is subordinated to the problem of national defense, it would be unthinkable in the United States, as no builder of a merchant vessel would construct a ship with a view to its conversion into a hospital ship in time of war, which probably was the case with the German ships converted into hospital ships. With us it would mean a very slow and costly undertaking, and the necessity of a hospital ship built for that purpose only is so much more apparent. (S. W.)

2. Vesiculectomy. Done either by the inguinal or ischio-rectal route. This is a difficult operation, which involves much damage, and is not to be recommended in the majority of cases.

3. Vasotomy. Described by Belfield, of Chicago. He approaches the vas deferens by a small incision made between the testicles and the inguinal canal. He opens the vas by another small incision and introduces a canula. Through this he injects solutions of argyrol, protargol, or collargol, lavaging daily in this manner the vesicles.

These operations proposed in the treatment of vesiculitis seem for the most part to be entirely disproportionate to the relative benignity of the affection, and should only be resorted to in extreme cases.

In the immense majority of cases the treatment should consist of—(1) Massage of seminal vesicles; (2) local treatment of verumontanum; ((3) catheterization of prostatic utricle and ejaculatory canals.

1. Massage of the seminal vesicles is difficult. It must be frequently done and for long periods of time. Many physicians do not really massage the vesicles proper, but only the prostate gland or the inferior extremity of the vesicles. To massage effectively one must reach the summit of the vesicle and express it from top to bottom. Without this precaution the massage is worthless. Even if this treatment of the vesicles is perfectly effective, it rests insufficient, because the other extremity—the ejaculatory canal in the verumontanum—is in need of treatment.

2. Local treatment of the verumontanum should be applied under visual control by means of the urethroscope. This is almost always ignored. The treatment should be continued at intervals. In the beginning, irrigation of the bladder and urethra with dilatation of the latter, are necessary to allay irritation.

When dilatation has been pushed sufficiently to permit easy passage of a fairly large urethroscope, the treatment may be begun. It should consist of the application of caustics to the mucous membrane of the verumontanum itself. These applications are never painful, do not produce the tenesmus which is so disagreeable in the course of deep instillations, and are followed by the happiest results. Under their influence the verumontanum is relieved of all pathological products—polyps, edema, and sanguinary extravasations; and after a certain time this treatment will obtain a verumontanum perfectly regular and smooth, upon which may be seen with greatest precision all the capital points which characterize it.

It is at this moment that the prostatic utricle and ejaculatory canals may be conveniently but carefully explored. The necessity to catheterize the ejaculatory canals comes from the fact that very

other) ; then with a little groping, lightly done, the ejaculatory canal is reached.

RESULTS.

After I had begun in my practice a regular and methodical catheterization of the ejaculatory canals, as an indispensable complement to the treatment of vesiculitis, the results which I obtained were extremely satisfactory. In vesiculitis the evacuation of pathological products contained by the vesicles is obtained by massage, and the drainage following, which dilatation has enabled, has yielded most excellent results. A most interesting case, in which marked benefits following catheterization of the canals were observed, is the following:

M. J., aged 40 years; gave a history of three attacks of gonorrhea, accompanied by prostatic and testicular complications. When he came to see me, in August, 1912, he had considerable discharge containing gonococci. His urine was cloudy in four glasses. Examination revealed prostatitis and his epididymes contained indurated nodules. The seminal vesicles, especially the left, were painful. Treatment was begun by washing the bladder and urethra with permanganate solution, combined with massage of the prostate and seminal vesicles. The urethra was next dilated, first with sounds, then with the three-branched dilator of Frank.

In spite of all this, in the first days of January, 1913, the left vesicle continued to be extremely tender; moreover, the important fact was established that by massaging, which produced great pain, the contents of the vesicle were not evacuated.

Finally, massage practiced under these conditions, without the introduction of any kind of an instrument in the urethra, aroused another attack of epididymitis in the left testicle. This inflammation, which did not have much of a reaction and which required only three to four days' rest in bed, receded rapidly. But these accidents showed clearly that massage failed to empty the vesicle, and that therefore the canal must be stopped up. It was only natural to think of reestablishing the permeability of this conduit.

It was with these conditions, when all inflammation of the canal had disappeared, that I urethroscoped this patient, January 17, using a 26 tube. It was easy to see the verumontanum, which, owing to the previous local treatment, revealed almost no inflammation nor bleeding.

The orifices of the ejaculatory canals were found on the sides of the verumontanum. I attempted to enter the left orifice with a small 5 urethral sound, but when the extremity of this presented before the orifice it slipped immediately on the curved and shining surface of the verumontanum. Under these conditions I took a small but-

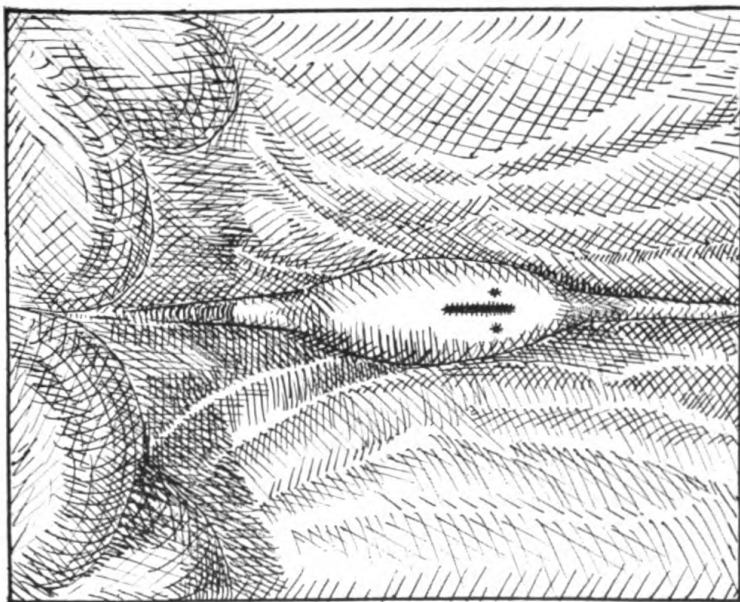


Fig. 1—A.

Orifices of ejaculatory canals situated laterally upon cheeks of verumontanum, symmetrically in relation to utricule.

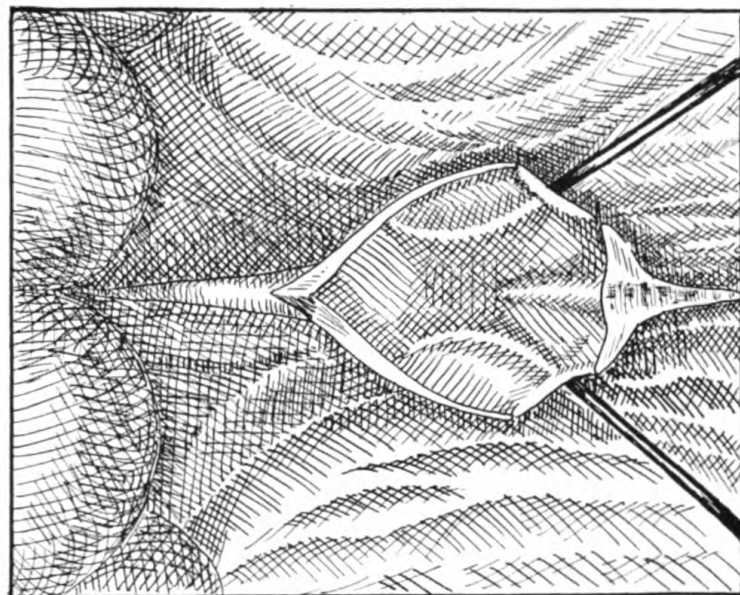


Fig. 1—B.

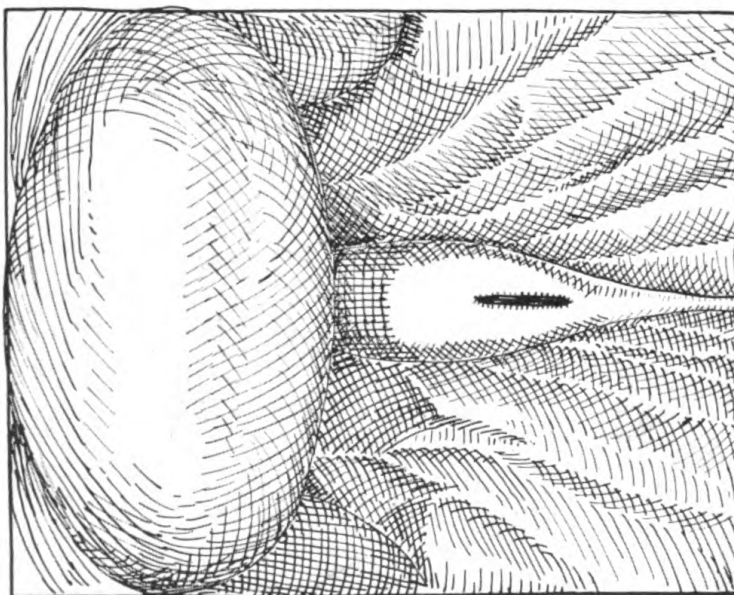


Fig. II—A.

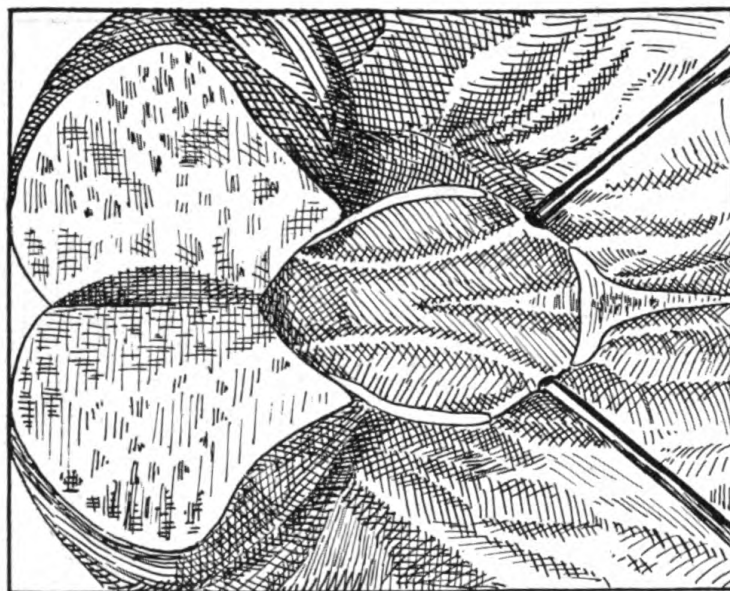


Fig. II—B.

Openings of ejaculatory canals placed upon lips of ureter.

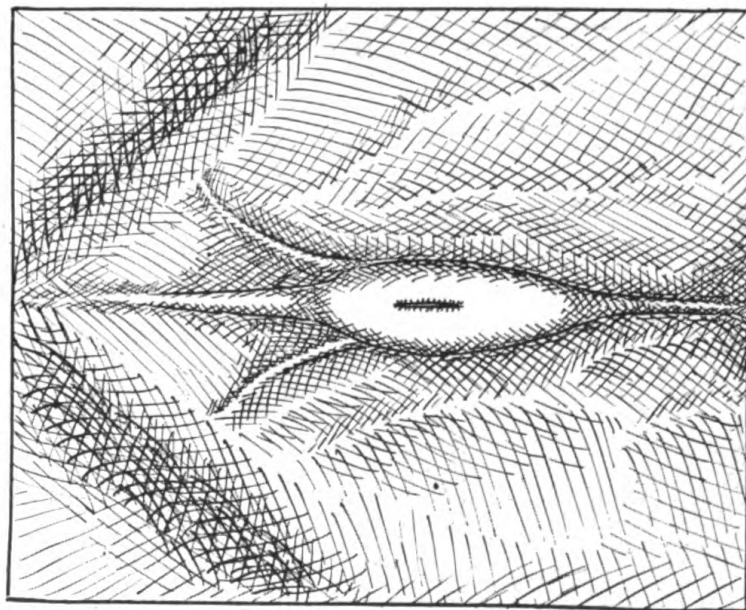


Fig. III—A.
Median utricle enlarged by incision; orifices of ejaculatory canals exposed well within its vestibule.

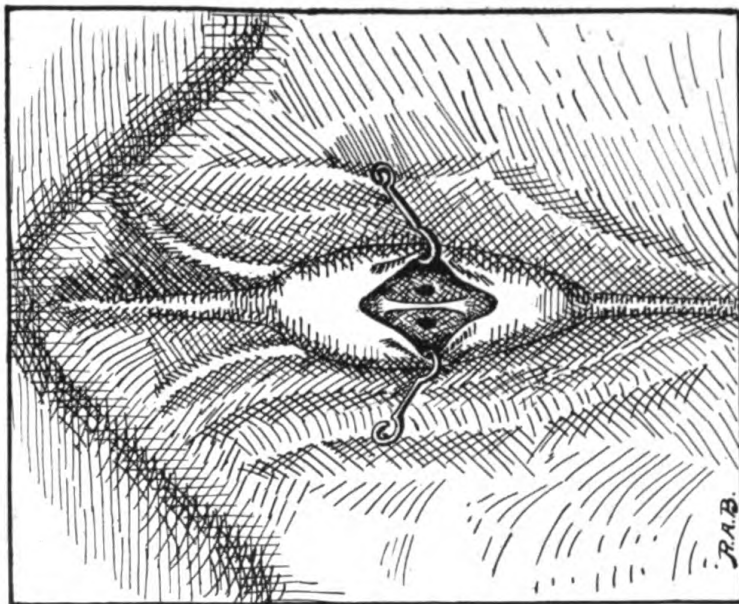
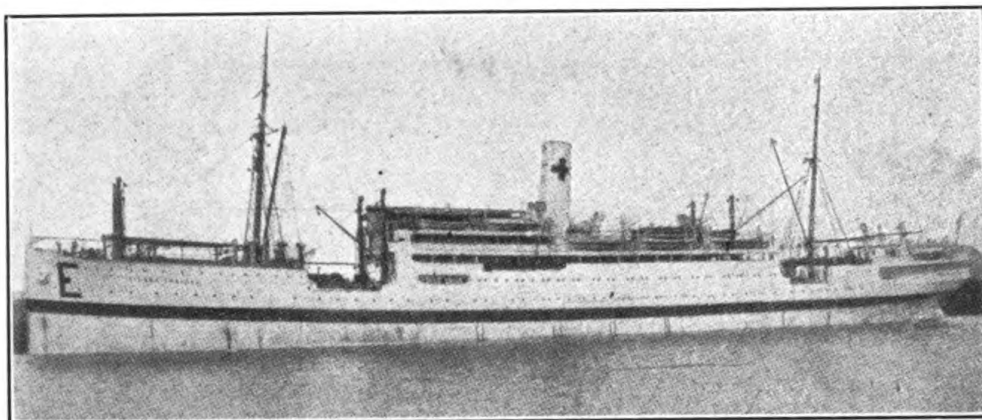
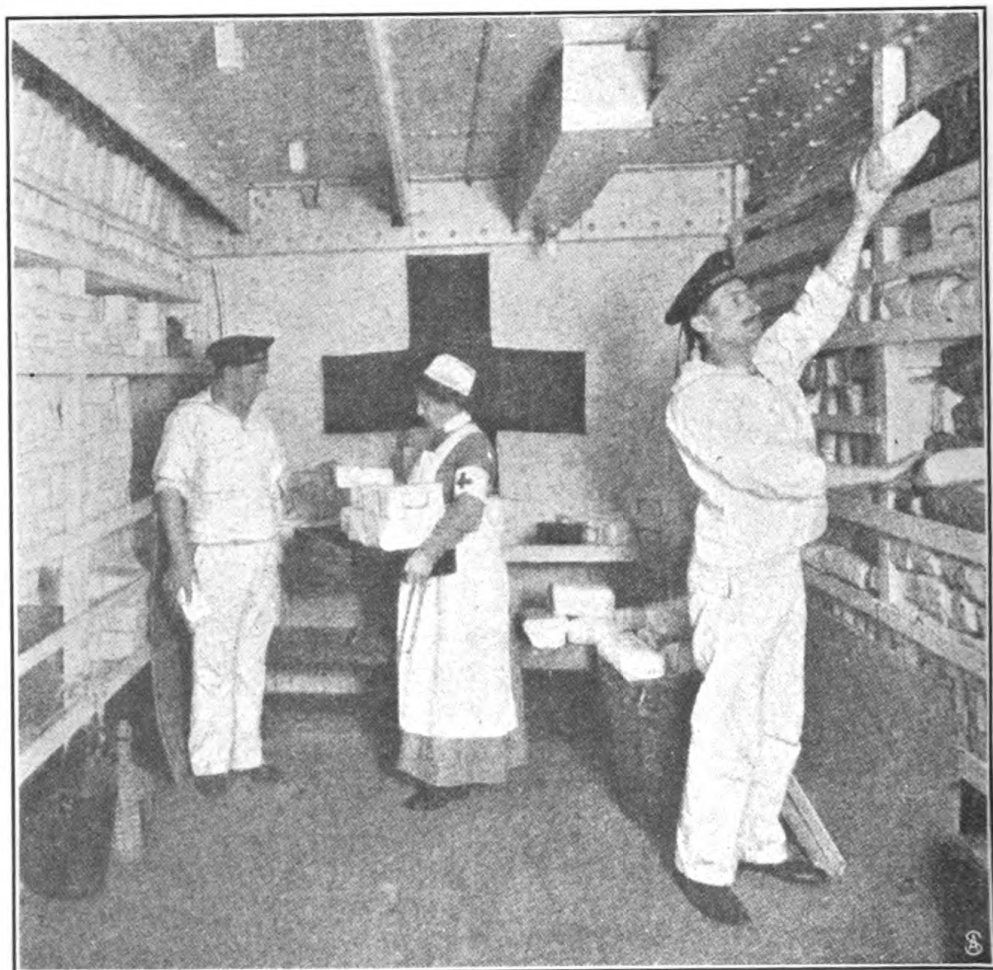


Fig. III—B.
Orifices of ejaculatory canals exposed well within its vestibule.

Weber—Hospital Ships.



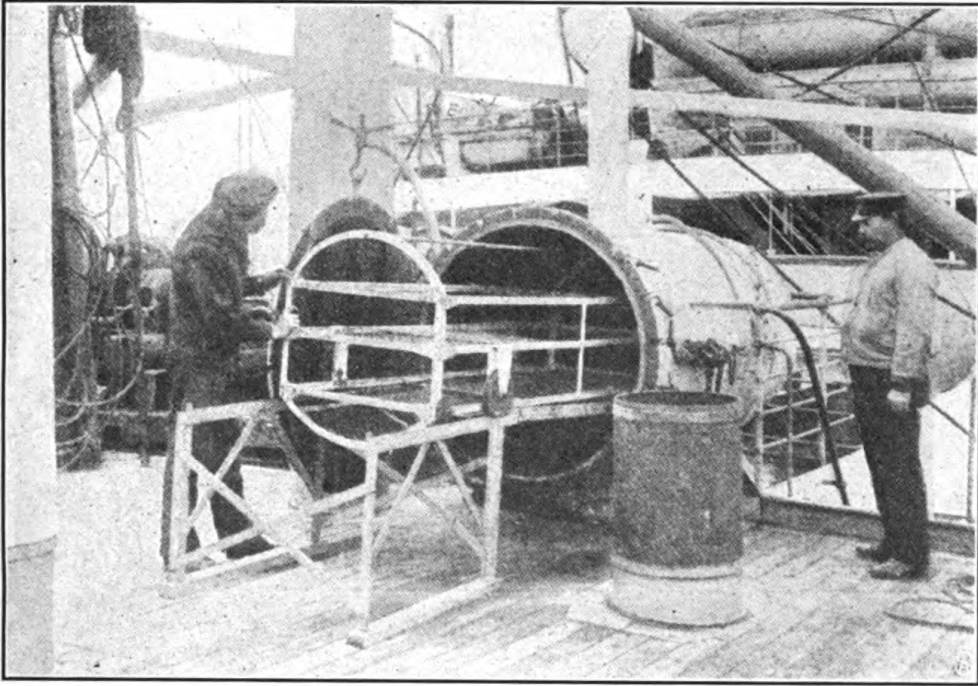
Hospital ship E.



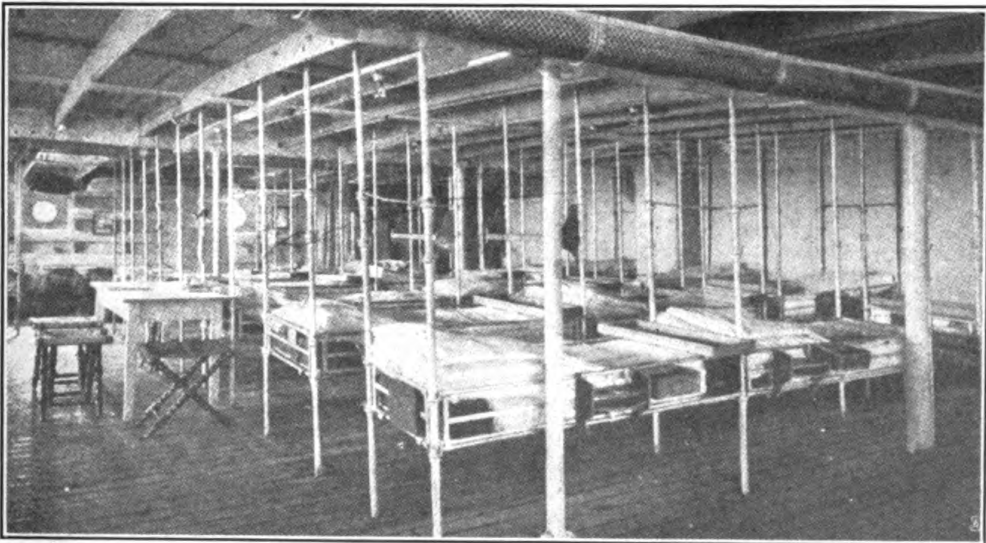
Bandage room.

430-4

Weber—Hospital Ships

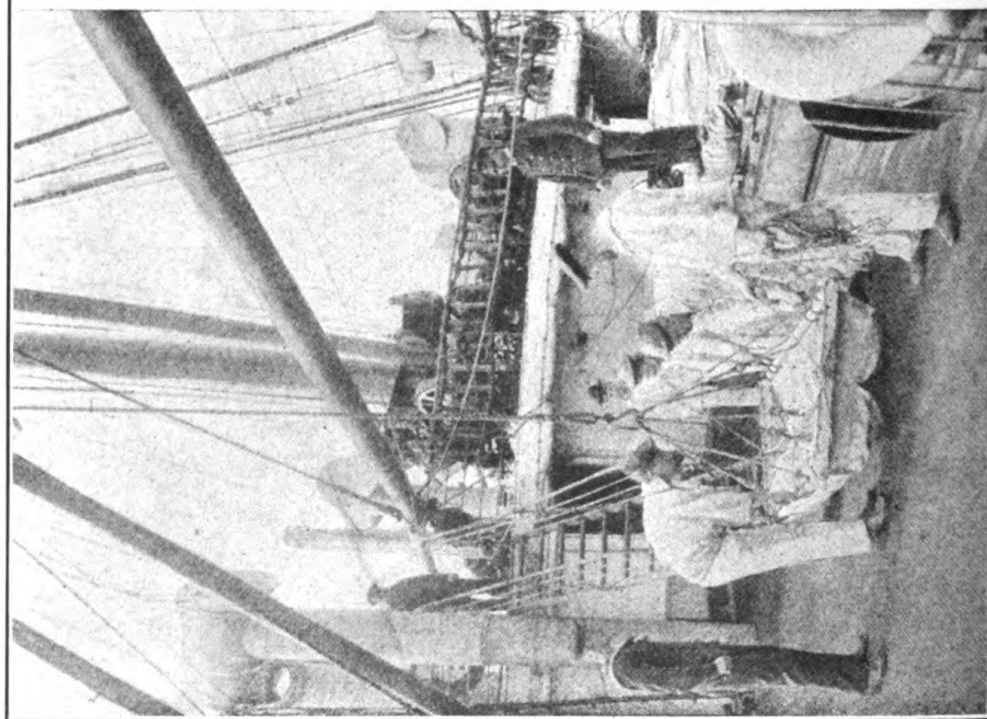


Disinfection apparatus.

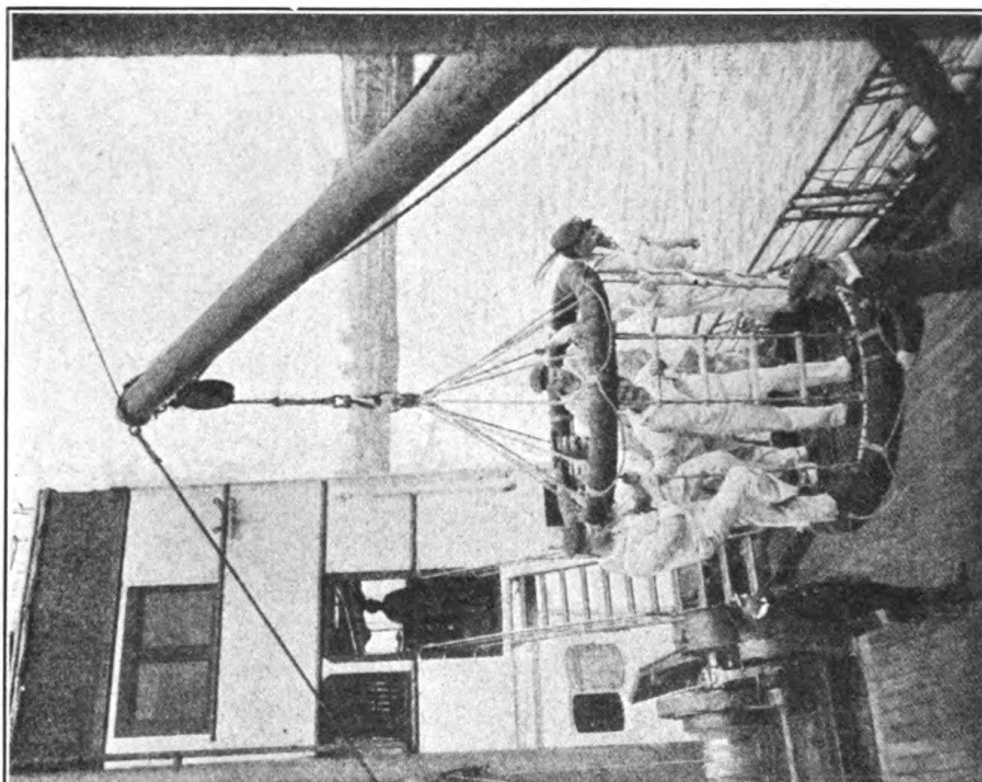


Medica ward.

450-5



Transfer of wounded.



Rescue apparatus.

It can not be emphasized too strongly how frequently these conditions of vesiculitis arise in the course of a gonorrhea and how long such a lesion may exist without being discovered, not only by the patient, but also by his physician. It is, indeed, quite remarkable how often physicians think of examining the prostate and leave the seminal vesicles without attention; yet of the two the general importance of the latter is far the greater.

What is important to remember when a chronic urethritis localizes in the seminal vesicles is the complete absence of all spontaneous pain and the few symptoms observed. Therefore it is repeated, in a urethritis which lasts unduly long the seat of the localization must be searched for in every case. The best means of recognizing this localization ought to be by rectal examination, but this is often rendered difficult on account of the high situation of the vesicles and the corpulency of the patient.

When the finger has passed beyond the horns of the prostate it encounters, unfortunately, above their external and superior edges, the seminal vesicles. An examiner not perfectly acquainted might easily pass to one side or the other of a diseased vesicle and not be aware of it.

The four capital diagnostic signs by which one can be sure that a vesicle is diseased are the following:

1. *Pain*.—A diseased seminal vesicle is always painful under pressure, and this pain should be compared with the other side. Often it is extremely acute and productive of immediate syncope.

2. The induration of the walls of the vesicles, which is always more or less accentuated.

3. The material expressed from the vesicle, "vesicular molds," obtained by massage. These molds vary in size and form. Often they are ribbonlike.

4. Pain at the level of the verumontanum, which should be found by an olive-pointed explorer. When it exists it is not the mark of a neurotic state, as formerly too often believed, but rather the sign of a chronic inflammation of the verumontanum itself. This organ, being situated at the mouths of the canals, is inflamed by reason of its contiguity, and its involvement is in reality almost always concomitant with an inflammation of the vesicles. Its tender condition might rightfully be termed a "ureto-vesicular reflex."

Outside of these precise signs there exists a series of symptoms which should arouse one's attention. They are:

1. The urine, which is either cloudy, or clear with long filaments in the first glass passed, or phosphatic.

2. Difficulties of micturition, dysuria or polyuria, often mistaken for indications of cystitis.

3. Pains, spontaneous but always vague, in the region of perineum, testicles, kidneys, or thighs.

4. Distant pains, pseudo-renal colic or sciatica.

5. Painful ejaculations, impotency, and yellowish or cloudy coloring of the semen.

6. Recurrent epididymitis.

7. And especially general disturbances consisting of general breakdowns or systemic fatigues. It is interesting to demonstrate that these conditions disappear rapidly under treatment for vesiculitis and that the patient recovers his entire health and energy.

These patients suffer for years with sensations of heaviness in the abdomen, dull pains in the perineal and lumbar regions or the thighs. They regard with despair the diminution of their virility and the existence of ejaculatory disturbances. They have a slight morning discharge and some filaments in the first glass of urine. They have frequently consulted physicians and specialists, and the result has always been the same. "Neurasthenic, neurotic, hypochondriac," has been the usual comment.

Such are the most frequent complaints one hears from these sufferers with chronic posterior urethritis, and they are indeed very unhappy. They are under the influence of a perpetual obsession, with an "*idée fixe*" that they are incurable; that they are beyond relief; that they can not marry; and that their lives are ruined forever.

The lesions which they present, by reason of their long duration, finish by creating always a neurasthenic state which occupies them continually, rendering their lives unbearable and leading them sometimes to commit suicide. Twice I have been a spectator to such catastrophes.

It is of the greatest importance that medical men be awakened to these facts. Too often, unfortunately, neurasthenics and neurotics are treated for their obvious symptoms, when it would be infinitely better to subject them to a careful examination of the posterior urethra.

TREATMENT OF VESICULITIS.—Operative treatment of this condition has been especially studied in the United States, and the following operations proposed:

1. Vesiculotomy; extolled by Fuller. A curvilinear incision is made above the anus, a finger introduced into the wound, and the space between the rectum and prostate and seminal vesicles explored. A grooved sound is passed into the vesicle and the vesicle opened by following this guide with a bistoury. This operation is a blind one, and does not meet present-day requirements.¹

¹ Translator's note: Squire's operation does away with this objection: it does greater damage to the musculature of the perineum, however. Fuller admits that special technical skill is needed to perform his operation. Both of these operations may be attended by post-operative impotence.

a fleet, and are equipped with all the hygienic comforts of the up-to-date passenger ship. A vessel built for this special purpose of caring for sick is not to be found in any navy as yet. It is believed that the British admiralty has authorized the construction of one of these ships, but it is not known whether this vessel is completed. Under these circumstances the different navies satisfy their need for hospital ships by the equipment for that purpose of merchant vessels. So it happened that our Navy, in accordance with previously laid-down plans, converted merchant ships to the number of seven into auxiliary hospital ships and six, with an average bed capacity of 300 patients, into hospital ships. These ships, converted into hospital ships in a short space of days, show in their exterior already their changed mission. In accordance with the provisions of the second Hague Conference, they are painted white, with a $1\frac{1}{2}$ meter wide green stripe in the case of Government ships and red stripe in the case of ships fitted out by benevolent societies or private individuals. Besides the national flag, they also carry the Geneva flag.

The main feature of these ships are the wards, which generally occupy the two upper decks, providing not less than 15 cubic meters of air space for each patient. The beds are either stationary, arranged with due allowance for the ship's motion, or swinging cots fastened to iron stanchions. Smaller wards for the accommodation of infectious diseases, mental and critical cases, and sick officers are also provided. Among other important features are the light and well-ventilated operating rooms, with anesthetizing rooms, dressing rooms, etc., usually located on the upper deck. An X-ray room is an absolute necessity. The dental care unavoidable in cases of injuries to the jaw necessitates a dental office with complete equipment for the treatment of such cases. The medical cases are usually in wards not adjacent to those for surgical, skin, eye, and ear cases, but are located next to the dispensary, and connect with a room for electrical and hydrotherapeutical treatments. It is hardly necessary to mention that each ward has its own bathroom facilities. The different laboratories are located next to the wards occupied by the infectious diseases, which latter also require a disinfecting plant. Other necessary adjuncts of hospital ships are ample kitchen space, cold storage facilities, laundry, repair shop for instruments, sewing room, and storage rooms for medical and surgical supplies. A library for the crew and for professional reference is also provided.

Of great importance on a hospital ship is an easily operated arrangement for the transfer of sick either from or to the ship, and for this purpose a double swinging cot is used, hung from a boom. On the ship itself elevators take care of this problem. A life-saving apparatus is also included in the equipment. The personnel of the

hospital ship consists usually of the senior medical officer and three juniors, a pharmacist, and a dentist, finally hospital corpsmen and Red Cross nurses. The operation of the ship remains in the hands of a civilian master and crew.

FIRST-AID STATIONS AND TRANSPORTATION OF THE WOUNDED IN NAVAL BATTLE.¹

Translated by S. G. EVANS, Medical Inspector, United States Navy.

"First-aid stations," "stations for wounded," "battle hospitals," "dressing stations," etc., are some of the terms which indicate in which part of the ship of war the injured should receive their first assistance. The question is not new; for a long time every Congress which included a section upon naval medicine has inserted the subject in the program. This interest proves that among all people the same sentiment of generous humanity recognizes the need for a quick and practical method of helping the sailors who have fallen in the service of their country. It is also an evidence of the fact that the ideal method has not yet been found.

Notwithstanding the numerous discussions and the excellent works written by naval medical officers and also by the admirals, who have not failed to present their ideas upon the subject, this important question, which should, of course, occupy the attention of the commander as well as ourselves, is by no means as yet settled. It is this that encourages me to return to the subject, with the firm conviction not to settle it, but to add a new stone to the edifice, aided by the writings of the past, and the experience of the latest naval battles. Dr. Wise, United States Navy, published in 1905 an excellent work on the subject of first-aid in naval warfare. He there considered particularly the following subjects: (1) Position of the first-aid stations; (2) post and needs of the medical officers during combat; (3) urgent cases.

His conclusions are:

1. That the medical officer should not insist upon having definite first-aid stations placed in the ship during her construction, because at sea or during action these stations might not be capable of being used on account of unforeseen and insurmountable obstacles.

2. That during a prolonged naval battle the wounded would be in such great numbers that it would be impossible for them to receive the medical officer's assistance and they should be able to help themselves or each other.

3. The surgeons, like other officers, should not be unnecessarily exposed, but it is not possible to admit that their seclusion or inac-

¹ By M. le Dr. P. Barthelemy, *Medecin en Chef de 1re classe de la Marine*; from *Archives de Medicine et Pharmacie Navale*.

tivity during the heat of combat is justified either by the condition of modern warfare or by humanitarian considerations.

In the course of his remarks, Dr. Wise criticizes severely the opinions of the Spanish medical officer, the French Redondo, and Richer de Forges, who advanced the principle that during the action period of the battle the medical personnel should be kept behind the armor belt ready to respond upon the first signal which is made by the commander. "We are certain," said Dr. Wise, "that every medical officer of the American Navy will not be carried away nor influenced by such an opinion; we believe, rather, that every naval battle is a risk in which all should take their part."

This is a beautiful sentiment, which should be applauded by all naval medical officers without distinction of nationality, because all are equally brave and possessed of that high degree of self-sacrifice which has been so often manifested. But it is not perhaps a question here of personal courage. Two opinions are before us: Should the medical officers during the battle remain within the armor belt or should they, on the contrary, move about among the wounded, carrying with them their stretcher bearers and nurses (hospital corpsmen). I believe the question definitely decided since the last war between Russia and Japan.

In the height of battle, when projectiles are falling like hail upon all parts of the ship, the doctors are unable to intervene. They would soon be swept away like chaff by a hurricane. Their position should be to wait in the midship section of the ship a cessation of hostilities or a relaxing of the struggle and to dart forth immediately to the aid of the wounded under the order of the commander, an order given by necessity only. Upon the commander rests the sole responsibility during the continuance of the action. The medical officers during all the fighting should be a precious aid to him and not for an instant a constraint.

I believe that Dr. Wise a year later expressed himself in the following terms at the Congress in Lisbon:

In regard to the status of medical officers, where there is but one, in my opinion, his safety should be carefully conserved; but when there are more the medical officers should move freely about the ship to any point where emergency surgery may be demanded.

We are certainly of the same opinion.

This point being settled, let us divide our work and provide a summary of the subject which has been the order of the day in the Fifteenth Congress of Hygiene and Demography, at which we had the honor to be present.

The following four subjects were successively considered:

1. Should there be one or several first-aid stations, and which should we occupy?

2. Should first-aid stations be provided during the construction of the ship or simply before action?
3. With what materials should the stations be equipped?
4. Duties of the station and instruction of the men in serving the wounded.

CHAPTER 1.

Ought there to be one or many first-aid stations, and in what position should they be placed?

The fleets of the great powers of to-day are composed of battle-ships, battle cruisers, and powerful destroyers. The first two types alone enter the first line of battle; they are ships well protected in their vital parts and furnished with turrets, casemates, and conning towers. How do these vessels of war enter battle?

The cruisers enter the battle with all the upper works uninhabited; all the crew are behind the steel armor. The commander and his aides are shut in the conning tower, the brain of the ship, an elevated citadel above the bridge, with a full view of the horizon. The gunners are at their posts at the guns—that is, in the turrets, in the casemates, etc.—from which come out only volleys and salvos, which are intended to carry destruction and fire to the enemy's ships. The mechanics, engineers, and electricians are at their posts; the fire room a vision of Dante's *Inferno* at the time the ship speeds with all her power. All the organs are protected by the armor; in the smaller spaces are the riflemen, the seamen acting as sentries, attending the commander for orders from the bridge, etc. Thus, on a cruiser ready for battle, we find the combatants shut in veritable fortresses, forming so many cells, separated from each other by wide spaces, relying on their own methods of transmission.

To these combatants, scattered through the protected parts of the ship, it is necessary to assure medical aid. A shell, finding a defect in the armor and entering a compartment, its explosion momentarily depopulates the compartment of its defenders. How can we assure aid? Evidently by installation of first-aid stations, we all say at once, and no one disputes it. We should have many stations, but all need not be of the same importance. We should have, as in the Army, not a rudimentary service, but one which is simple and practical as well as efficient. Also the service at the rear, more important, more complete, should be provided with equipment such as we are not able to realize on the line of fire.

There is to-day in all our armored vessels, the only ones we are considering, a space between decks, between the two armored decks, and protected by the side armor. These spaces, of which the higher is above the water line, are found at equal distance from the bridge

and keel of ship. It is in this long-divided space that the French and a number of foreign ships installed the battle hospital or the principal first-aid station.

Many of the ships have also two stations of this kind—one aft, the most important, in which should be stationed the chief medical officer during the combat, and the other forward, generally smaller, which is the station of the junior medical officer. There are also the old first-aid stations far down in the ship, where the wounded in the Spanish War refused to be sent.

The medical service is then disposed of amidship. It is not in the least in the line of fire. Its material is behind armor. The wounded who have been sent down from the upper decks during a lull or in the course of the action find themselves well protected from renewed attacks.

The battle hospital on the Russian cruiser *Czarevitch* was described by Fontan in 1904 as a model of its class. It is located between decks. This space is generally easily accessible by numerous hatches and passageways communicating with both upper and lower parts of ship.

So much for service in the rear. Let us now consider it on the line of fire. Numerous naval writers have overpraised certain positions in the between-deck spaces of the ship, protected either by raising up the armor or by two opposed turrets, but not defended against oblique or a downward fire. These posts seem to have been proven failures by the experiences during the late wars.

No part of a ship above the between-deck spaces which is not a conning tower, a turret, or a casemate is protected from the enemy's fire. At any moment it may be swept away or destroyed. Why, then, is it necessary to place a station where the wounded and the medical officer will be able to stay only to be annihilated by shells? Why persist in placing there the wounded, who, when at their regular station, would at least be behind armor? It is even farther yet that we should carry the first-aid station. It is in the small compartments (forts), where we find the combatants, that we ought to place them. Therefore the turrets, casemates, conning tower, etc., should also be first-aid stations. They should be provided with distilled water to quench the thirst of the wounded, and all prepared to give rapid help to the injured, awaiting a lull in the action to permit the wounded to be taken down to the main hospitals. With this conception of a small first-aid station in the immediate vicinity of the combatants, it is absolutely essential that each man be provided with a first-aid package, and be capable of applying it to himself or to his fellows. This method has been adopted in the French Navy. The men in turrets, casemates (cage masts), receive especial instruction

in first-aid. The order of October 9, 1907, has made it a regulation that first-aid boxes be installed in all turrets, casemates, etc. These, then, are the firing line first-aid stations.

CHAPTER 2.

Should first-aid stations be provided during the construction of the ship or only at the moment of action?

The divergence of opinion which in the past has been manifested on the subject, to-day is becoming more and more rare, and one can say that an agreement has been almost completely reached among the medical officers of the various navies of the world. Dr. Wise, the brilliant American, in his interesting work quoted above, speaking of first-aid stations, says:

We are not ready to believe that it would be reasonable to insist that the stations should be definitely installed during the construction of the ship, for when at sea or during action these stations would be perhaps useless on account of unforeseen obstacles.

A year later, at the International Congress at Lisbon, he was less positive. He said:

In my opinion it will be impossible to definitely fix stations for aid on ships of war while the question of naval construction is such a vexed one, etc. Given fixed conditions this question might be solved, but it is impossible now to do so.

All French officers are practically in favor of providing stations during the making of the plans of the ship. Leo, in an article published in 1901, arrived at the conclusion that the stations should be provided during the construction of the ship, and, adopting this idea, the chief constructor ordered that the stations be placed in places protected from shells, sufficiently well ventilated, well lighted, and as near as possible to the parts of the ship furnishing the wounded.

The doctors agree, says Dr. Auffret, and the day will come when the sea-going branch and constructors will also understand each other. Make the battleships more uniform, and when a decision has been reached in regard to the wounded do not again change the designated position. "Why," adds he, "are we not able to foresee in the plans of the ship a place especially provided for such use?"

Conteaud and Girard also share in this view. Speaking of the errors in evidence in the installation of first-aid stations, they write:

When the construction of a ship is completed it is difficult to assign a place to be converted into a first-aid station.

In all our writings and our reports upon this important subject we have always defended this proposition, that the battle hospital

should be provided during construction. We insist that it be removed from the depth of the ship, where the wounded could never be taken, and that it be placed nearer the combatants, in a well-protected space, easily accessible, in a ward in the between-deck spaces.

In England Dr. Mark Beadwell demands for a first-aid station or hospital a specially protected position. His ideas are completely concurred in by Admiral Sir Bodwen Smith, who believes in the idea of a well-protected space. Among the Italians the distinguished Dr. Phillippo Rho in a complete article advances clearly the following:

First aid stations and passages should be studied for each type of ship, and the preference should be given to locations well ventilated, well protected if possible by armor, and it is strongly to be hoped that this matter will be studied in the plans for the construction of the ship.

Antonio Rodriguez Braga, of Lisbon, wishes that the first-aid stations should be established a short distance from the combatants on the various decks; they should be well protected on all sides. But these stations would be difficult to install on most ships. This impossibility, however, no longer exists, if in the construction of the ship of the future we consider well the aggressive and defensive conditions of the ship and of the armor for the combatants. In consequence of the fact that such armor is never invulnerable we should consider the exigencies of the medical service in battle. Surg. Gen. Susuki, of the imperial Japanese Navy, who took part in the Russo-Japanese War in the capacity of fleet surgeon, has published a very interesting report upon the duties of the medical department of the Japanese Navy during battle. For this officer the ideal hospital is provided in the plans of the ship, situated below the water line, well lighted and ventilated and equipped with means necessary to conveniently transport the wounded.

As I have said at the beginning of this chapter, the agreement on this question is practically unanimous among those interested. The almost unanimous opinions of all medical men who have written upon the subject is that the battle hospital should be provided during construction. There are not many deep spaces in a ship where the heat is extreme or where the ventilation is bad from which it is necessary to make a choice. On battleships and on cruisers the naval constructors and line officers are with us in claiming that the hospital should be placed in the between-deck spaces.

This idea has been wisely realized in the French Navy by the order of the secretary under date of February 18, 1910. Article 12 of these instructions orders:

Forward and aft under cover of the armor there shall be placed two operating stations designed for complicated first-aid and for grave intervention during the battle.

These two stations are the same size as the operating room in peace times, augmented, if it be possible, by lockers and washstands. They are equipped as are operating rooms in peace times and are provided with energetic artificial ventilation to permit of the use of anesthetics, but they are not heated. As far as possible the operating stations are placed in the center of the ship, with a door on each side sufficiently large to permit the passage of a litter carrying the wounded and to place the wounded on the hold deck once the first-aid station is completed. The wounded after being helped are put out in the spaces situated in the vicinity of the operating room, without which it would be necessary to build special places in these rooms.

CHAPTER III.

With what should we provide the first-aid stations?

First, let us establish a distinction between the first-aid station on the firing line and the battle hospitals. The aid stations on the firing line should assure the first assistance to the men stationed in casemates or in turrets, almost always injured by the splinters of shells. How then can we help the wounded fallen at their post? Before deciding the question let us examine what practice on the field of battle teaches us and profit by the experiences acquired either on land or at sea to equip our practical first-aid stations rapidly and completely. Let us recall the words of Volkmann:

It is always true that first-aid dressing decides the fate of the patient and decides the final outcome of the wound.

Since 1892, a time when it was my privilege to assist at a bloody conflict on shore during the campaign in Dahomey, the question of first-aid on the field of battle has always been the object of deep study. During this expedition I established before the fighting first-aid stations equipped with all the articles which we found in our medical cases. It was, therefore, not necessary to occupy ourselves in searching for the material necessary for a dressing.

The dressings made beforehand were applied on the field with the greatest ease, a large wound requiring only five or six minutes and a lesser wound only two or three minutes. The men struck by the fire of the enemy were always dressed when it was necessary to proceed on the march to the front. With the happy results I obtained in a war where the wounded were of tremendous numbers I made all my efforts to help the sailors, and on January 22, 1903, I had the great satisfaction to see regularly installed in the ships of war the aid stations all prepared, such as I had proposed; that is, of three different sizes. During a session of the International Congress in Lisbon in 1906 I had the honor to bring up the subject of aid sta-

tions all prepared in time of peace, and especially in time of war, on the French ships.

This idea, born in France, has made rapid progress among foreign nations as well as among us.

In his report for the year 1905 Dr. Leo, chief surgeon of the north squadron, cites the opinion of the doctors placed under his orders. He expresses himself thus:

Dr. Bellot sums up the general opinion as follows: "It is in the case where one would have the time to bestow attention upon the wounds before transportation of the injured that the advantage of prepared dressings becomes strongly evident; but it will not be realized if the dressings have been delayed until the arrival at the far-away dressing station. The existence of three types of stations—large, moderate size, and small—permit us to provide for nearly all injuries relative to their size. One avoids with these prepared dressings the loss of time, without speaking of the inevitable contamination which would attend the packages of gauze or cotton undone before."

Dr. Gorron, of the *Henry IV*, declared that in case of combat the prepared dressings of Barthelémy rendered most efficient service, and that in landing parties they were particularly efficient, because they allow the surgeon, without unpacking all his pouch, to proceed with an excellent dressing, no matter whether on board or ashore. Drs. Averous and Brunet, who took part in the tragic and bloody marches of Casablanca, August 5-7, 1907, during which the sailors added another page to their glorious history, so expressed themselves in their report concerning the numerous wounded that they had to care for:

The usefulness of the first-aid prepared packages of many types of M. Le M. D. Principal Barthelémy is evident. We can not foresee an offensive action where we need more than the ambulance pouch. It is not necessary to wait to find the water or to boil it if one has the materials necessary to prepare the solutions, or at least to sterilize the hands, to prepare the operating field, or cut or tear cotton. Three measures present themselves with urgency: Protect the wound, put it in position to permit the proper treatment, and ease the pain. Thanks to the first-aid prepared packages contained in the bag, on the instant the first two considerations will be met on the field; and more yet, he adds, the new aseptic packages in our chest are perfect from all points of view. The wounded at Casablanca found in them a remarkable benefit; all were cured without suppuration in our ambulance, where all was temporary, where we were far from having an equipment such as we are accustomed to in our operating rooms, and where contamination was relatively considerable.

In action on board ship, then, the same results may be anticipated.

In France men-of-war are not the only ones adopting first-aid stations all prepared. The merchant marine has regulations for first-aid lockers, and the army has provided them for war time. Among foreigners the idea has not been overlooked. Have we not seen in the report of Surg. Gen. Susuki that the doctors of the Japanese fleet were provided at the beginning of hostilities with small

first-aid packages, and having found them too small the fleet surgeon wrote to the department to have large ones made for wounds by artillery. The Navy of Holland has adopted, since 1905, the prepared packet, Ulter-Moehe, consisting of a gauze compress, a bed of packing made up of two bandages fixed to the compress. The whole is applied so that nothing touches the part which comes in contact with the wound. These dressings of four sizes are contained in tin boxes, placed in the stations awaiting the action, in proportion to the size of the crew.

Dr. Wise, whom we have quoted several times, announced at the Lisbon Congress in 1906 that a board of officers of the American Army and Navy had been recently appointed to study the question of first-aid, and that this board, of which the report had not yet been published, recommended prepared dressings, some for large and some for small wounds. (The Stokes shell-wound packet antedates this.) Last year I had the pleasure of meeting at official, but none the less cordial, functions Dr. Miranda, of the first Italian squadron, who had come from Bizerta to greet the President of the French Republic. This very agreeable confrère, in a charming talk, told me that all the Italian ships were furnished with first-aid packages prepared exactly as those in the French Navy. After this we must be convinced that the prepared first-aid package is the one of choice in battle. It alone permits of rapid dressing of wounds; it avoids the long preparation of an ordinary dressing, the contamination of the packages of cotton and gauze, etc.; and it avoids inevitable waste.

The first-aid package has already received with great success a baptism of fire. Averous and Brunet have informed us of the wonderful results obtained in relieving the wounded at Casablanca.

Are not they naturally designed for equipment of the stations on the firing line, the turrets, casemates, conning tower, etc., which are then provided for combat with—

1. First-aid packages.
2. Distilled water for drinking.
3. A strong pair of scissors to cut the clothing.
4. Means to arrest hemorrhage.

In these different locations the regulations of the French Navy require that there be placed at the moment of action the following:

1. Vessels of distilled water.
2. A bag containing the prepared first-aid dressings, a pair of scissors, two strips of cloth.
3. Metal boxes containing four dressings of the large type. These boxes are distributed in the ratio of two for each turret and each gun room and four for the conning tower.

With what should we supply the battle hospital? These stations, situated in the lower-deck spaces behind the armor, are evidently more complicated than the first-aid stations on the firing line. The surgeons here should be able to apply rapid dressings to the wounded sent down during the battle, operate upon the urgent cases during pauses in the fight, and proceed with advanced aid to the gravely wounded. For their multiple purposes, does it not appear that the first-aid package would play an important part?

I can not do more than enumerate the surgical material allowed by the instructions of the Secretary under date of February, 1910, for the operating station of war. These stations, provided for during the construction of the vessel, are two in number—one forward and the other aft in the between-deck spaces. Each has a washstand or washbasin, a closet for linen and pharmaceutical materials, and two fixed lamps of 30 candlepower. In times of peace they do not have any medical material, but they contain the preparatory necessities (piping, etc.), so that one is able to install, before the action, the material placed in times of peace in the positions belonging to the medical department not protected or in storerooms.

THE FORWARD OPERATING ROOMS.—Electric sterilizer; operating table; a metal table with shelves for dressings; a washstand with foot pedals; two reflectors of 30 candlepower; an oil lamp with reflector.

THE AFTER OPERATING ROOM.—A small bathtub from the examining room; an operating table; a dressing table of dressings from examining room; a lavatory with pedals; two reflectors of 30 candlepower; an oil lamp with reflector.

The medicine cabinets of the dispensary are placed before battle in the storerooms of the medical department, or, if necessary, on the lower decks.

So much for the surgical material. Let us now take up the question of first-aid dressing.

At the moment of mobilization a battleship or a cruiser is already provided with first-aid material for 658 dressings of different sizes, divided as follows: Large, 113; medium, 318; small, 227. A large number, more than sufficient for a serious and bloody battle. In the Navy the dressings of different sizes are the ones to be chosen, both for the battle stations on decks and the battle hospitals.

CHAPTER IV.

THE METHOD OF OPERATING THE STATIONS.—The necessity of instructing the men in the method of applying the prepared packages is apparent.

We have seen in one of the preceding chapters the upper works of the ship are uninhabited, the combatants are shut in the conning tower, turrets, and casemates, and the medical officers and their assistants occupy the battle hospitals on the protected deck. The conning tower and turrets will furnish, very probably, the first wounded, struck by the splinters of shells which come through the small openings in the armor. The men occupying these posts have at their disposal first-aid packages for extreme cases. The wounded, if not too gravely hurt, retires in a corner and, as well as he can, applies on the wound a first-aid dressing. If the wounded is struck at a point that he can not reach or attend to himself, or if he is too seriously injured, one of the crew of the gun rapidly aids him and returns at once to his station.

In the course of the battle perhaps an explosion of a shell starts up a large fire in one of the deck spaces. The fire brigade, until then held behind the armor in reserve, probably receives orders to combat the fire. During this maneuver the crew is likely to have several wounded or men overcome by the smoke or gases. They will be immediately taken to the hospital by their comrades or litter bearers called to them. These sanitary formations which revolve around the protected operating rooms are placed in a position where the seriously wounded await their turn to be taken to the operating table. On all sides a quick action makes it possible for a first-aid man to dress rapidly in the operating rooms the men slightly injured after being operated upon (in case of extreme need), and all dressed are taken out upon the lower deck spaces, where mattresses and beds are provided in advance to receive them. The fight continues, the wounded becoming very numerous in the turrets, casemates, etc. Then the enemy moves away or for some reason the fire relaxes considerably. At this moment the commander, always well advised of the serious happenings which are going on in the numerous closed compartments, gives the order to remove the wounded to the battle hospitals. Immediately the junior surgeon, the hospital corpsmen, and litter bearers, furnished with excellent means of transportation, go where their presence is needed. With all possible speed they relieve the wounded, immediately placing them on litters and removing them to one of the spaces of the battle hospitals, according to their nearness, their size, and the ease of transportation. Little by little order is reestablished, the wounded have been replaced with the reserves. Again the fleets or squadrons approach each other and the fight begins again more fiercely than before.

Always under the order of the commander, the only judge of the situation, each one has resumed his post. The hospitals are again fully active. A number of wounded have been sent down during the

lull. The surgeons are applying first aid, etc., and arresting hemorrhage if there is need. At a new interruption of the fighting or at the end of the action, thanks to the first-aid packages, all prepared, with which one is able to work so quickly, the ground is already cleared and the injured are in the best condition to be later and more completely attended to, which can not be done during the lull and only when the action is entirely over. But to reach this happy result it is absolutely essential that all men occupying positions in the turrets, gunrooms, etc., should be capable of administering first-aid to the wounded. It requires not at all a complicated instruction; to give a little water and to properly apply a first-aid dressing is certainly not an operation above the intelligence of our men. It is then in the times of peace that the doctors should give this elementary instruction to the crew. The men are trained particularly in the use of the first-aid packages and their efficient application, to approximate as closely as possible the conditions to be met in time of war. Each should be furnished with a first-aid manual. Additional rewards for advancement would stimulate their zeal. The results which one can obtain are excellent. I have seen it accomplished in some great cases where, as senior medical officer, I have had charge of the hospital corps.

TRANSPORTATION OF THE WOUNDED.—I will be brief upon the transportation of the wounded, this question having been placed in the discussion in another section of the Congress and should in consequence be treated aside. I will say of it only a few words to complete my subject.

To rapidly clear out a turret or gunroom full of wounded so that the place will be completely ready when the action is renewed, it is necessary to have means both simple and practicable.

All powerful nations have adopted certain means of transportation, some presenting numerous advantages and some of little use. In France we have the model of the army, the hammock of Guezenec, and the Auffret model. The army litter is useless on board, safe only in a horizontal position, which is the exception in use on ships. This should be kept for landing forces where it is certainly useful for transportation.

The hammock of Guezenec has been too often condemned for me to repeat a description. It is convenient because it can be taken anywhere, but the placing in it of the wounded takes some time, and one with a fracture is not comfortable; in fact, he is the contrary. Fortunately it is disappearing.

There remains Auffret's stretcher, which we have seen is the best (evidently did not see the Stokes splint stretcher). It is an apparatus, says Fontan, easily carried to the wounded, and will hold him com-

fortably and firmly if he has a fracture of the head, of femur, or of the pelvis, and will support his passage almost without suffering. But these various methods of transportation take a relatively long time to place therein the wounded and to transport them to the hospital. Therefore they should be held strictly for the severely wounded and in cases where other means of removing them can not be used.

There is a means of transportation much used in the latest wars; that is, arm transportation. The late Dr. Themoin, surgeon in chief of the navy, after an extended study of the subject during the Russo-Japanese war, wrote in *The Archives de Medicin Navale*:

If one considers the means which were employed for the transportation of the wounded, one can not fail to be struck by the following, how much better it was on the Japanese ships, provided with drilled bearers and perfect equipment, than on the Russian, where the bearers were little instructed and the stretchers very defective and transportation by hand was almost exclusively used.

Personally I am of the opinion that this is the only method to which we should often resort because it is practicable and rapid. But even with prepared first-aid packages it is necessary that in times of peace the men should be thoroughly trained.

This training should, above all, consist in (1) transportation by one, two, or three bearers; (2) transportation by two bearers in positions which give rest to the wounded.

The Manual for Naval Hospital Corps Regulations of the French Navy since 1906 describes at length these methods. (Vide United States Navy.)

A useful exercise consists in establishing in the fleet drills for transportation by arm method.

To sum up:

The wounded able to walk go by themselves or with a hospital corpsman to the battle hospitals. The wounded that are unable to stand are conveyed by the arm method. Only the gravely injured, those having fractures of the legs and body, are carried in the litters.

It is by design that I have not spoken of the various accidents that might occur amongst the engineer's force. The compartments are well protected; it would be always relatively easy at all phases of the fight to come up to the hospitals whether wounded or burned.

EVACUATION OF THE WOUNDED—HOSPITAL SHIPS.—The guns are silent; the naval battle is finished; the two adversaries are finally separated from each other, with damages more or less severe. On board the doctors have completed their crushing work. On certain ships the wounded are in great numbers; major operations are needed for some of them. Should one attempt operating on a ship which has been in battle for many hours, which will be perhaps

liable to again fight the next day? What should we do with all the wounded now, a great hindrance to the efficiency of the ships? Here as at many other points the necessities of war go hand in hand with the laws of humanity. These wounded it is necessary at any cost to disembark, and very naturally this brings up the question of hospital ships—a question equally brought up in this day's program and which I do not doubt will be completely settled.

Already, in 1906, the Lisbon Congress took the view that all governments were much interested in hospital ships and their protection in time of war. Vice Admiral Paschen, of the German Navy, considers a hospital ship indispensable to a fighting fleet. England has absolutely agreed, and the military records of February 14, 1912, show that England has decided upon the construction of a hospital ship to receive and to save the wounded and shipwrecked. This will be the first ship in the world constructed entirely for this purpose. Supplied with every desirable arrangement and a most modern equipment, the price is to be £150,000. It should be completed in a year, the Admiralty desiring that the ship be in the service without delay.

Gentlemen, I close. As I have said at the beginning I have not the least pretension to settle the debate. Profiting by the experience and instruction of all, my ambition has been to perfect the aid to the wounded and to assure to all our sailors struck down in the defense of their country rapid and efficient aid. My prepared first-aid dressings tried in the field of battle have given me much help. I have striven at the end of each chapter to describe the fixtures, the progress which has been realized constantly in the French Navy.

My great wish is that in a great congress like this the representatives of the great powers will bring to us, in such an important question, all the new appliances regularly used in their service. One should have thus, for the installing of first-aid stations of the future, a choice of methods which would serve in a happy manner to reach perfection. Progress is not the labor of one; it results from the association of collective efforts of all our representatives here assembled by the meeting of all civilized nations.

PROGRESS IN MEDICAL SCIENCES.

GENERAL MEDICINE.

B. THOMPSON, Surgeon, and E. L. WOODS, Passed Assistant Surgeon, United States Navy.

KRUMBHAAER, E. B., and RICHARDSON, R. The value of typhoid vaccines in the treatment of typhoid fever. *Therap. Gaz.*, N. S. xxx, No. 12, December, 1914.

Distinctly favorable results are reported, especially in the later cases, where a better vaccine was given in larger doses. The vaccine was prepared from the Rawlings' strain, according to Wright's method, heated only to 56° C. for 30 minutes and with 0.3 per cent of lysol added as a preservative. The dosage varied from 50,000,000 to 1,650,000,000, given in one to five doses. In the latter cases it was found better to start routinely with 500,000,000 and repeat two doses of 1,000,000,000 each at three-day intervals. The injection was given subcutaneously, not intramuscularly, in the arm, and no ill effects were noted beyond some local soreness and a rise of 1° or 2° in temperature lasting for 24 hours. This rise is stated to be an evidence of increased toxemia, not of infection, and of no detriment to the patient.

The report covers 93 cases in which the vaccine was used, and in nearly all there was a distinct impression that the patient improved after vaccination. In the great majority the temporary rise of temperature was followed by a drop, frequently to normal, and the patients looked and said they felt better, and in all cases were willing to have the second injections. Generally speaking, the larger and earlier the dose the better the results, the mortality and number of relapses and complications are usually less, and the patients seem less toxic and run a shorter fever.—(L. W. JOHNSON.)

VEEDER, B. S.. The intravenous and intramuscular administration of diphtheria antitoxin. *Jour. Missouri Med. Assn.*, April, 1915.

The reaction between toxin and antitoxin is not a simple process like a chemical combination. The toxin leaves the blood and unites with the cells for which it has a special affinity. If there is antitoxin in the blood it may unite with the toxin. A certain time is, however, required, as the union is not immediate. If the toxin has already attached itself to the tissue cells, the antitoxin must do the same

before a neutralization can take place. Under these circumstances a high degree of antitoxin concentration is necessary. If a lethal dose has been absorbed before the antitoxin begins to unite, the outcome can not be modified by any amount of antitoxin.

The author reports interesting results of experiments to determine the effect of antitoxin administration on the reaction of previously applied Schick tests. The action of antitoxin given subcutaneously was found to be delayed very much, as it did not modify the Schick reaction made at the same time. When the same amount of antitoxin was placed in the deep muscles, a skin test made two hours before was somewhat suppressed, and one made at the same time the antitoxin was given was negative. When the antitoxin was placed in a vein a skin test made four hours before gives a faint reaction, and one made two hours before would be negative. So the time element is the most important, and the best results are obtained when a high degree of concentration is obtained in the shortest time. There is a large amount of experimental evidence which shows that the closer an injection of antitoxin follows a lethal toxin injection the smaller amount of the former is required to inhibit.

Deycke has collected the mortality figures in 78,028 cases and found that of cases of diphtheria receiving antitoxin on the first day 4.3 per cent died; second day, 7.6 per cent died; third day, 14.7 per cent died; fourth day, 19.7 per cent died; and fifth day, 31.6 per cent died.

The problem is to get the antitoxin into the blood stream as rapidly and in as high a degree of concentration as possible. The total amount is not so important.

When antitoxin is given subcutaneously the curve of absorption and production of immune units rises slowly and does not reach the maximum until the third day. With intravenous injection the maximum is present at once, but the amount falls rapidly. In the intramuscular method the highest concentration is reached in 24 hours and remains about the same for several days. The diminution in amount of antitoxin is very gradual. From the work of the author it is deduced that the intramuscular method is generally the best.

The selection of proper antitoxin doses is a difficult question. The author does not believe extra large doses are required, and further believes that, as far as the antitoxin part of the treatment is concerned, 2,000 to 5,000 units given intramuscularly or intravenously will cure any case of diphtheria in which the lethal dose of toxin has not already been fixed in the cells. It is not the total amount of antitoxin which counts, but the rapidity with which it is thrown into the blood stream to neutralize the absorbed and forming toxins. The author writes of children, and the data and doses must not be applied to adults.—(E. T.)

GOODMAN, E. H. *The noninfective causes of so-called rheumatism.* Interstate Med. Jour., April, 1915.

When one thinks of the above title gout comes to the front as the most prominent example. The two real facts in gout are the accumulation of uric acid in the blood and the deposition of urates in certain tissues of the body. The mere excess of uric acid in the blood does not, however, explain gout. The excess of acid is present in other conditions not at all gouty; such as leukemia, pneumonia, and suppuration. The uric-acid theory is tottering on an unstable foundation, and we are growing more inclined to the view that the real cause is a disturbance of intermediary purin metabolism.

In normal metabolism the uric acid is a derivative, partly of nuclein of cell nuclei and partly of hypoxanthin from muscle. Uric acid is one of a group called alloxuric bodies, because each is made up of an alloxan and urea radical. All have in common a hypothetical body "purin." The alloxuric or purin bodies are thought to be contained in the nucleic acid of the cell nucleus in the form of loosely combined phosphorus compounds.

The purin bodies may be "exogenous," being formed from food or "endogenous" resulting from disintegration of body nucleins. The endogenous purins are chiefly derived from muscle, particularly the hypoxanthin radical. Just where the uric acid is formed is not known. The kidneys are not the only organs that produce it, for extirpation of both kidneys has been followed by an increase of uric acid in the blood. There is proof that livers of geese can synthesize uric acid from ammonium lactate, but whether this can be done in the human liver is not known.

Some hold that ferments are responsible for the formation of uric acid. The purins are progressively split and oxidized until uric acid is formed. Then the uricolytic ferment (uricase) takes a hand and disposes of the uric acid into carbonic acid and ammonia. When the process is normal only a small amount remains to be excreted by the kidneys.

In gout there is always hyperuricemia, which is due not to increased formation of uric acid, but to some other factor. In explanation our theory is very simple and merely states that the kidneys are impermeable, elimination is incomplete, and uric acid accumulates by simple retention. There are objections to this theory, among them being (a) in gout, nephritis, and blood poisoning (all with hyperuricemia) the total elimination of uric acid is normal in time, and (b) in gout associated with chronic nephritis the kidneys are well able to excrete more than normal amounts of uric acid for several days after an acute attack of gout. A second theory assumes that there is a deficiency of the uricolytic ferment, uricase, and less uric acid is, therefore, broken up. This would be a real theory if the

normal presence of uricase could be demonstrated in the human body. As yet it has not been done.

It is a peculiar fact that cartilage has a tendency to precipitate urates from solution in the blood of gouty subjects. This is a laboratory fact, but just as peculiar is the fact that this reaction will not take place with blood of cases of nephritis or leukemia, although the degree of uric acid saturation is the same. So why sodium urate will precipitate in gout and not in other diseases with the same amount, or more, of uric acid excess in the blood is an unsolved question.

Does the mere excess of uric acid cause gout? In lead poisoning, chronic nephritis, leukemia, as well as gout, there is always hyperuricemia; and in pneumonia, septicemia, and following the excessive use of purins there is a temporary increase of uric acid in the blood, yet gout does not develop. As regards the toxicity of uric acid it may be stated that (a) it may be given to animals in large doses intravenously without producing any signs of intoxication; (b) it may be given to patients with nephritis in amounts as great as 3 grams daily with no ill effect; (c) it has no deleterious action on nerve muscle preparation. A chemical compound possessing such low toxicity seems scarcely able to produce such violent reactions as are seen in gout.—(E. T.)

WELFELD, J. Not very well known causes of hematuria. *Illinois Med. Jour.*, May, 1915.

The average medical man ascribes hematuria to one of two causes, either tumors of the bladder or surgical kidney. The urethra itself may be the cause of profuse recurring hemorrhage from either of the two following pathological conditions. Quite frequently, as a result of gonorrhea, fissures or rhagades form in the urethral mucosa, which as linear ulcers become covered with granulomata. Such granulomata invariably harbor nests of gonococci, which continually reinfect the urethra. Incidentally they bleed very freely, as shown by touching with a swab during endoscopy.

The other sources of urethral hemorrhage are the granulations which so often develop posterior to a stricture.

As to hemorrhages of vesical origin it is safe to say that they are more frequently caused by inflammatory conditions than by neoplasms.—(E. L. W.)

FOWLER, R. H. Prodromal symptoms of gall-stones. *Northwest Med.*, April, 1915.

Of the surgical dyspepsias caused by lesions of the upper abdomen gall-bladder dyspepsia is the most frequent. In this class surgery has not found such great activity because of the lack of precision in

early diagnosis. Physicians have waited for the classic picture. The classic picture is based upon the post-mortem pathology of late complications. It is a phase of the symptomatology, improbable of failure of recognition, namely, the passage of stones from the gall-bladder into the ducts, lodgment therein, jaundice, a tender tumor in the gall-bladder region, infection outside the biliary tract, and the occurrence of gripping adhesions. The early symptoms of gall-stones in the gall-bladder or of their early formation are referred not to the gall-bladder but to the stomach. They are obscure when viewed even in this light. Entirely too much stress has been laid upon gall-stones. It is the infection in which we are interested. Pathologically the formation of stones is best explained by infection. The initial infection may manifest itself as dyspepsia or in definite symptoms of cholecystitis. It is unlikely that stones are found in any one attack. Repeated mild attacks of inflammation probably result in dyspepsia, while a more severe infection manifests itself clinically as a more or less typical attack of cholecystitis. If we recognize that the initial infection of the gall-bladder (a cholecystitis) is an essential factor in the formation of stones, cholelithiasis may be considered a complication or sequel of cholecystitis, a late stage of the same infection. Pathologically cholelithiasis is almost constantly associated with cholecystitis. Clinically this is also very often true. Just what factors are involved in determining the infection in one case will result in one particular kind of inflammation of pericystic adhesions and in another in gall-stones it is not possible to state. There are no symptoms associated with cholecystitis which we can attribute to the manufacture of gall-stones. In other words, there is no diagnostic criterion to distinguish noncalculous catarrh from a sluggish stone-forming inflammation. In a measure, then, it is true that stones of themselves cause no symptoms when present in the gall-bladder, the infection being responsible. They are, however, a source of more or less constant irritation to the organ and aggravate the inflammation initiated by the original infection. Strictly speaking, then, one should not speak of gall-stone dyspepsia, but of gall-bladder dyspepsia. Just as appendix dyspepsia is due to infection, so gall-bladder dyspepsia arises from infection. In the early diagnosis of disease of the biliary tract gall-stones have no place. We should operate for cholecystitis.—(E. L. W.)

QUINBY, W. C., and FITZ, R. **Observations on renal function in acute experimental unilateral nephritis.** Arch. Int. Med., Feb., 1915.

Quinby and Fitz undertook the comparison on the same animal of the various tests for renal function most commonly in use in studying unilateral nephritis. They followed Baehr's method of

injecting uranium nitrate into the exposed renal artery of one side, which produced marked unilateral glomerular changes, with little tubular destruction. By different degrees of dosage and by varying the length of time which the disease was allowed to run, various stages of acute, subacute, or chronic one-sided nephritis were obtained. The tests for renal function fall into two distinct groups. The first group depends on variation in the physical and chemical properties of the urine coming from each kidney. The most important of such tests are the determination of the freezing point of the urine and the comparative amounts of nitrogen, urea, and diastase excreted in a known period of time. The second group of tests depends on the ability of the kidney to excrete from the blood abnormal substances which are introduced into the circulation. Indigo-carmin and phenolsulphonephthalein are the most important of this group. The phloridzin glycosuria test, though strictly speaking not belonging in this group, may be included for convenience.

The tests for renal function used in surgery are based on the facts that a diseased kidney is incapable of excreting solids, and that the degree of impairment of this fundamental function, in a general way, parallels the degree of existent disease. Therefore, the important feature in the selection of a test for renal function, when the urine from the two kidneys is compared, is to choose that one which is simplest for both surgeon and patient to perform, but which is delicate enough to point out the degree of existent disease.

Their tests on dogs were undertaken to determine this point experimentally. The results of these experiments fall into two groups. One group consists of animals whose kidneys anatomically were normal, yet functionally were pathological. The functional condition encountered suggested a hyperpermeability of the kidney to water, chlorid, nitrogen, and, in certain instances, to various dyes. No explanation for these findings is offered. The other group of experiments consists of animals in which a well-marked nephritis was produced. In these animals tests for renal function were applied and gave results similar to those which have been reported in human beings.

Clinical tests have suggested that a close parallelism exists between the degree of kidney destruction and the kidney's ability to excrete various solid substances, and that all the tests most commonly used in the study of renal function give parallel results. The experiments reported demonstrate by a variety of tests for renal function, made on the same animal at the same time, that such a parallelism does exist, but that certain tests are more significant than others. The total excretion of nitrogen from one kidney over a given period of time, as compared with the excretion from the other kidney, gives accurate information in regard to the existence and degree of disease. The

comparative excretion of diastase from the two kidneys is a valuable test for renal function when the amount of urine from the two kidneys is nearly the same. This test has a striking disadvantage. Dilution of urine produces such marked differences in the diastase excretion that when the urine from the two kidneys is excreted in different amounts the observation becomes valueless.

As the renal disease advances and the urine becomes more dilute, the freezing point approaches zero. This determination, however, is not so sharp a quantitative test for renal function as the excretion of nitrogen or dye substances. Of the two dyes commonly used, phenol-sulphonephthalein is the better. It can be injected in small bulk, is excreted rapidly from the kidneys, and the amount put out can be quantitated accurately. Indigo-carmin does not show changes in renal function which are not demonstrated by phenolsulphonephthalein, and has two disadvantages. It requires a considerable amount of injection fluid and its excretion is difficult to read colorimetrically. The latter objection can be obviated in part by intravenous administration of the dye.

The excretion of potassium ferrocyanid parallels that of phenolsulphonephthalein and indigo-carmin, but it is more difficult to estimate colorimetrically. Hence, for practical purposes, it is of no value as a test for renal function. The reaction of the urine from a severely diseased kidney apparently tends to become less acid than that from the normal side. This variation, however, is not sufficiently marked to be used as a functional test for one-sided disease.

It appears, therefore, from the foregoing experimental observations that renal function is best estimated by the determination of nitrogen excretion and by the phenolsulphonephthalein test.—(E. L.W.)

MENTAL AND NERVOUS DISEASES.

R. SHEEHAN, Passed Assistant Surgeon, United States Navy.

LEE, R. I., and HINTON, W. A. **A critical study of Lange's gold reaction in cerebrospinal fluid.** *Am. Jour. Med. Sc.*, July, 1914.

In 1912 Lange described the action of cerebrospinal fluid in various conditions upon a colloidal gold solution. He demonstrated that this reaction could be used as a delicate test differentiating normal from pathological cerebrospinal fluids, and more particularly syphilitic from other affections of the central nervous system. This has been confirmed by other observers.

The theory of the reaction is based upon the observations made by Zsigmondy that—

1. Solutions of electrolytes precipitate colloidal gold.
2. Proteins in the absence of an electrolyte also precipitate a solution of colloidal gold.

3. Proteins in the presence of an electrolyte inhibit precipitation in colloidal gold solutions—the so-called Gold-Schutz.

The relation existing between this opposed reaction of electrolyte and protein is definite for the same protein, but differs when a different protein is used. One is therefore a specific property of the individual protein.

The same theory is: (a) That substances in pathological spinal fluids will precipitate colloidal gold provided the globulin and nucleoprotein fractions are held in solution with a 0.4 per cent sodium chlorid; (b) that there is a characteristic change for certain diseases involving the central nervous system.

The technic is as follows: Ten chemically clean test-tubes are used, in the first of which is placed 1.8 c. c. of 0.4 per cent sodium chlorid solution, and in each of the others 1 c. c. Then 0.2 c. c. of cerebrospinal fluid, free from bacteria or blood, is added to the first tube with a 1 c. c. pipette. This is thoroughly mixed by pipetting, and then 1 c. c. is taken from the No. 1 and placed in No. 2, 1 c. c. from No. 2 and placed in No. 3, etc., until the 10 are so treated. The 1 c. c. from the last tube is rejected. The dilutions are now 1 to 10, 1 to 20, 1 to 40, etc., up to 1 to 5160. Now 5 c. c. of reagent are added to each tube. The change may be noticed at once, but is best shown in 12 to 24 hours.

In pathological fluids the change in color of the reagent is gradual in the series. The results should be uniform, graded reactions. Success depends upon (1) scrupulously clean glassware, (2) accuracy in all measurements, and (3) avoidance of bacterial contamination of spinal fluid. The color change is expressed with numbers, representing the slightest increase in blue tint, 1 slightly greater, and so on through to 5, which represents an absolutely colorless solution. The more uniform intensity of change and not the quantitative amount of change has diagnostic value.

The test is quite diagnostic of tabes. It is invariably positive in paresis. In cerebrospinal syphilis the reactions are intense.

It is not parallel with the blood Wassermann reaction, the spinal-fluid Wassermann, the globulin, or the cell count, but is apparently more constant in syphilitic affections than any other test.

The blood Wassermann reaction is present in only 43 per cent of cases diagnosed as syphilis of the central nervous system. The Wassermann reaction of the cerebrospinal fluid was positive in 59 per cent of cases. Both were absent in 24 per cent of the cases of presumable syphilis of the central nervous system. It is obvious that it is not possible to exclude syphilis of the central nervous system on the basis of the Wassermann reaction of the blood or cerebrospinal fluid, or both.

Cell counts above 10 were found in 63 per cent of the cases of syphilis of the central nervous system and below 10 in 27 per cent of the cases so diagnosed. Counts below 5 are normal; 5 to 10 are doubtful. The value of the cell count is impaired by the fact that other conditions which may be confused clinically with syphilis often show a great increase in the cell count.

The globulin tests (Noguchi's butyric-acid and Nonne's ammonia sulphate) are not satisfactory. A standard of positive and negative reactions is difficult and many reactions are doubtful. It is positive in 77 per cent of cases of syphilis of the central nervous system. A gold reaction typical for syphilis is nearly constant in cases of syphilis of the central nervous system. The test is more delicate than the blood Wassermann, spinal-fluid Wassermann, cell count, and globulin content.

The test has the advantage that it gives a reaction with pathological spinal fluids due to other causes than syphilis; that it is characteristic and easily differentiated from the reaction typical for syphilis. The test is delicate, the reaction is sharp, the technic simple, but care is necessary.—(R. S.)

AIKIN, J. M. **Post-operative nervous and mental disturbances.** *Am. Jour. Med. Sc.*, May, 1915.

This article is based on the perusal of the literature bearing on the subject as well as the opinions of a number of prominent medical men as to the importance of surgery as an etiologic factor in mental disturbance. At first sight it would seem that it is responsible. However, close analysis indicates that the case is not proven, as it can not be said that the psychic state was not the sequence of other causes. The number of cases of the so-called post-operative insanity reported is noticeably less since the advent of aseptic surgery. It is concluded that they are caused rather by sepsis, administration of drugs, or poor judgment in operating on a patient who is ripe for a mental upset, the latter being the most frequent cause, and that the forces making surgery necessary are more potent in the production of the mental disturbance than the operation itself. Further, there must be considered the other side, where surgery established relief from such disorders.—(R. S.)

JONES, E. **The significance of the unconscious in psychopathology.** *Brit. Med. Jour.*, Dec. 5, 1914.

Dr. Jones considers that there are three different current uses of the term "unconscious." In the first it was regarded as a synonym for "nonmental," and was therefore not concerned with psychopathology at all. The second conception of the unconscious was purely

philosophical, as developed by such writers as Harlivan, Meyers, Jung, and others. The field of psychopathology was hardly an appropriate one in which to deal with it. The third conception of the unconscious was the scientific one developed by Freud. He divided those mental processes not accompanied by awareness into two groups, the preconscious and the unconscious proper. These conclusions might be summarized as follows: 'The unconscious was a region of the mind the content of which was characterized by being repressed, curative, instinctive, infantile, unreasoning, and predominantly sexual. The six attributes, together with others not mentioned, made up a consistent and clearly defined conception of the unconscious, formulated on the basis of experience that might at any time be tested.

The significance of the unconscious in psychopathology might be discussed under four headings. In the first place, a knowledge of its content and mode of operation furnished a key for the understanding of numerous morbid manifestations that previously seem bizarre and meaningless. It had given a consistent interpretation of them and had revealed their coherent and intelligible structure. The reason was that all psychopathological symptoms arose in the unconscious, which was the true seat of the disorder, so that the investigation of it was of cardinal importance for both pathology and therapeutics. In the second place, this knowledge made clear not only the meaning of the manifestations, but also the causation of them. Normally a great part of the energy pertaining to the repressed trends of the unconscious was directed (sublimated) to permissible social aims. This denoted a partial renouncement of the crude pleasures obtained by indulging in these tendencies and a replacement of them by others, more or less satisfactory refined ones. Many persons found it by no means an easy matter to achieve this renouncement, and were in constant danger of relapsing into the old indulgences and gratifications, particularly when the attractions of the more refined aims flagged, as they must whenever the environment became more painful, difficult, or disagreeable; then the mental interests and energies were apt to "regress" toward older and more primitive modes of functioning. In the resulting conflict neither set of forces was entirely successful; on the one hand, the repressing forces managed to prevent a complete return to the primitive modes of gratification, while on the other they failed in transforming the energies in question into sublimated activities. A compromise was reached whereby both sets of forces come to expression, though only in a partial and disguised way. These compromise formations were clinically called symptoms and constituted the various psychopathological maladies. In the third place, the knowledge gained by investigation of the unconscious bridged over the gap between the normal and the abnormal

by demonstrating that the same processes went on in both, though the control of the unconscious ones by consciousness was greater in the case of the former.

Roughly speaking, insanity presented a picture of the normal unconscious. Last, but not least, was the remarkable aid that this knowledge had yielded for the treatment of the psychopathological maladies. Up to the present this had been greater in the case of the psychoneuroses than in that of the psychoses, but there it had already proved so valuable that the hope was justifiable that further researches might be profitable from the point of view in the case of the latter group also. The mode of action of the treatment, in a word, was that the overcoming by means of psychoanalysis of the resistances that were interposed against the making conscious of the repressed unconscious material gave the patient a much greater control of this pathogenic material by establishing a free flow of feeling from the deeper to the superficial layers of the mind, so that the energy of the repressed tendencies could be diverted from the production of symptoms into useful social channels.—(R. S.)

SURGERY.

A. M. FAUNTLEROY, Surgeon, and E. H. OLD, Passed Assistant Surgeon, United States Navy.

MARTIN, F., and CARROLL, A. H. *The rôle of gastro-enterostomy in the treatment of ulcers.* Ann. Surg., May, 1915, page 557.

In the case which furnishes the basis for this paper the authors were enabled to observe the contents of the stomach propelled by normal peristaltic contractions through the pylorus, although a perfectly patent anastomotic opening existed. This observation, together with other features of the case, has led them to make certain reflections and conclusions that are in themselves interesting and furthermore represent a change in attitude toward the operation of gastro-enterostomy which is rapidly becoming general.

Although it has been conceded that gastro-enterostomy has had no effect upon ulcers situated elsewhere than in the antrum, at the pylorus, or in the duodenum, the operation has been generally applied to the treatment of ulcers occurring in these areas, because it was supposed that by it a condition was established favorable to their healing. Statistics, however, show that the favorable results obtained in this class of selected cases are not of a lasting nature, recurrence or recrudescence of the ulcers in and about the pylorus and first part of the duodenum having taken place in at least 45 per cent of the cases.

In considering the reasons for this frequency of recurrence, the authors reiterate the fact that ulcers near the pylorus are benefited

by a gastro-enterostomy, whether the improvement be due to the diverting of stomach contents or to permitting a reflux into the stomach of alkaline intestinal juices, and that ulcers situated elsewhere are unaffected. Furthermore, they state, ulcers in the pyloric region are accompanied by a spastic condition of the pyloric muscle producing more or less occlusion of its orifice, whereas ulcers situated in other regions of the stomach have no such influence on the pylorus. They therefore believe that the influence of a gastro-enterostomy is favorable in so far as it relieves an existing spastic pyloric stenosis, and the improvement is comparable to that following gastro-enterostomy for organic obstruction. The results in these cases, as is well known, are immediate and brilliant.

This, however, is not the end of the sequence. After the irritation of the pylorus has been suspended for a time by the diversion of food from the ulcer-bearing area, the spasm of the pyloric sphincter ceases, and the pylorus now being patent the stomach contents resume their physiologic course, it having been shown that the stoma will not drain continuously or with certainty so long as the pylorus is patent.

Although it is true that by the operation hyperacidity is often diminished, whether by reflux of alkaline secretions or by more obscure effects, it has never been shown that this neutralizing feature is in itself of marked utility, and the principal objective of the operation has been and is to secure physiologic rest to the ulcer-bearing area. Yet it appears that this objective early ceases to be operative, since physiologic rest is obtained for the pyloric region only so long as the condition remains sufficiently acute to produce an obstructive spasm of the pyloric sphincter. With the subsidence of the irritation and the resultant relaxation of the spasm, which may or may not wait upon complete healing of the ulcer, the old ulcerated area resumes its physiologic work and the lesions are very likely to start into activity again.

The summary refers to the foregoing and in substance draws the following conclusions:

Gastro-enterostomy does not offer permanent relief in preventing recurrences, complications, and the tendency to malignant degeneration.

In all cases, pylorectomy (excision of the ulcer-bearing area) offers a greater promise of success than any other operative procedure at our command.

The various operations of pyloric exclusion are inefficient and unscientific.

Only in permanent, benign stenosis of the pylorus may gastro-enterostomy be considered the operation of choice.—(H. W. SMITH.)

LUMBARD, J. E. **Ether-oil colonic anesthesia.** Surg., Gynec. and Obst., May, 1915.

Lumbard gives his technic of the ether-oil colonic anesthesia, the Gwathmey method having been somewhat simplified.

Have the bowel moderately cleared by compound licorice powder a few hours before operation. Two hours before the administration of the anesthetic irrigate the bowel with plain water until the return is clear. A squatting posture may assist in the final complete emptying of the colon. A hypodermic of morphin and atropin is given one-half hour before the anesthetic solution is administered. The patient afterward should remain in bed in a quiet darkened room until the anesthetic has been administered and he is ready for the operating room. Thirty minutes after the hypodermic, the patient is placed upon the left side with the knees well drawn up. A small soft rubber catheter with funnel attached is introduced into the rectum for about 3 inches.

The anesthetic mixture is composed of three parts of ether and one part of olive oil by measure. More than 8 ounces of the mixture is never used, the usual allowance being 1 fluid ounce to every 20 pounds of the body weight. Age, weight, weakness, fever, and such factors should influence the amount administered.

After measuring the oil and ether, they are poured into a bottle, which is corked and well shaken for 1 minute. The ether-oil mixture is allowed to gravitate into the rectum very slowly so that about five minutes are consumed. The catheter is then withdrawn and pressure applied over the anus to prevent expulsion of the anesthetic. Anesthesia comes on in 5 to 20 minutes. If anesthesia is delayed beyond 15 minutes, place a wet towel over the face, and if necessary give a few whiffs of ether or nitrous oxid from a closed inhaler. Should sudden or deep anesthesia occur, empty the rectum immediately with a large rectal tube having perforations at the side and end. The head of the table should be elevated and the abdomen massaged. If respiration ceases use artificial respiration and give gas bag of equal parts of carbon dioxid and oxygen. The rectum should be emptied during the last part of the operation. As soon as the patient has been returned to bed, irrigate the bowel with tepid water until the return does not show any ether-oil, and introduce 3 ounces of olive oil to be retained.

Lumbard has anesthetized 90 cases by this method and feels justified in recommending it for selected cases.—(H. W. SMITH.)

WILDEY, A. G. **Ununited fractures treated by long-axial drilling of the fractured bone-ends.** Brit. Jour. Surg., 11, No. 7.

Deputy Surgeon General Wildey publishes, by permission of the Medical Director General of the Navy, a description of a new and

unique operation for ununited fractures. The operation consists in freshening the ends of the fragments, so that all dense fibrous tissue is removed, and then drilling a number of holes lengthwise in the ends of each fragment. The drill holes must reach healthy bone tissue, so that the natural porosity of the osseous tissue can be imitated. This method of drilling holes was ventured upon as an experiment in a case of long-standing nonunion. To reach healthy bone by refreshing would have required the sacrifice of an impossible amount from the ends. The experiment was attended by complete success; callus was abundant.

The author has confirmed the results of the first operation by work on a number of old fractures of the tibia. These fractures have been ununited for varying periods, with more or less induration of the bones. In all there had been repeated attempts to induce callus formation.

The technic is as follows:

"The ends of the bone having been exposed, they are brought out into the wound and their terminal surfaces are refreshed by the removal of a very thin slice of the superficial tissue. The plugs of callus or fibrous tissue which block up the marrow cavities are removed from each end by a gouge or drill. The circle of indurated bone is then drilled in four or five places in a direction parallel to the long axis of the bone, using drills Nos. 1 to 3, driven either by hand or by an electric motor. Each drill hole ought to penetrate through the indurated area of scar bone until normal bone is reached. This is indicated partly by the lessened resistance to the drilling and partly by hemorrhage occurring freely from the holes when the drill is removed; this hemorrhage, in fact, is the best evidence that the drill hole has done what it was meant to—that is, opened up a vascular area of bone and put this into communication with the seat of fracture. Usually a penetration of 1 to 2 inches is needed to fulfill these conditions, but sometimes a still deeper drilling is necessary. The deeper the holes the greater in number and the larger in diameter they ought to be. Both fragments having been treated in this manner and replaced in as good position as possible, they are rigidly fixed by plates and screws. The wound is closed by Michel's clips. No drainage is used."

For results a rapid union is reported in every case; in fact, Dr. Wildey states that there was excess callus formation to a fault. In other words, the results were too good.

The true explanation of these striking results is yet in doubt, but it seems to be that there is an imitation of the canalization and porosity which attends natural repair. The osteoblasts are given a chance to get out and get to work. The periosteum did not seem to

have any osteogenic power, and the new, superabundant callus was formed by osteoblasts that had evidently migrated from good bone down through the drill holes.—(E. THOMPSON.)

War surgery. Editorial Jour. Am. Med. Assn., March 13, 1915.

An opportunity is now afforded to secure authentic information from military surgeons with regard to the immense experience in the present war of all sorts of wounds and pathological conditions, by over 50 pages devoted to naval and military surgery in a recent issue of the *British Journal of Surgery*. Some of the material will be of interest to the surgeon in civil life. The number of infections in connection with land battles and the lack of infection in wounds acquired in naval actions are matters of special interest. Exposure to cold often proves serious for those wounded on shipboard; but in his article on "The Medical Aspects of Modern Warfare, with Special Reference to the Use of Hospital Ships," Charles A. Pannett, of London, says:

It is astonishing how mild the infection of wounds has been. The absence of earth dust on ships and the fact that in many cases the wounds are washed by a longer or shorter immersion in the sea probably account for this. It is possible, for instance, in large, lacerated wounds of muscular masses, such as those in the thigh, to suture the severed muscles and close the wound completely, with a very good prospect that healing will take place by first intention. The excellent physique of the men is a great factor in the success which follows these efforts, and it also accounts for the very striking absence of shock and the readiness with which the patients rally under treatment from such shock as may be present. The sailor is an excellent surgical risk.

On the other hand, the writer of the notes on "A Visit to Some of the Military Hospitals of Paris and Boulogne" declares that among wounded soldiers there has been an "orgy of sepsis." He adds:

Whether this can be prevented or lessened is the biggest surgical problem of the war. The cases in which it occurs are usually large lacerated wounds caused by shell fire or by bullets striking compact bones and bursting out of the tissues.

The main reason for all the infections is the delay in dressing. Prevention, as every surgeon knows, is the watchword of efficiency in surgical asepsis. If surgery were the first instead of the last consideration of war, then, no doubt, arrangements could be made for all the serious wounds to be dressed on the field fully and properly. As this can not be done, sepsis is always inevitable, and the consequence is a great many serious, often fatal, septic conditions.

The worst septic complication of wounds that has been seen frequently during the present war is the so-called gas gangrene. There

are a series of forms of this, and not all the cases are by any means necessarily identical with acute emphysematous gangrene. The cases as a rule begin as a cellulitis, with much gas formation, and rapid sloughing of tissues, and then gangrene eventually develops, running a rapid course. The causative agent has always so far been found to be some form of an anaerobic organism. It is not always the same organism. Pus is not produced in the early stages, but only sloughing and gas formation. Later on, if there is a reaction toward recovery, the pyogenic organisms gain a foothold and predominate in the condition, and pus is freely produced in the devitalized tissues. Frequent irrigation with hydrogen peroxid has done the most good. A stream of oxygen gas directly on the wound has given good results.

Lately Sir Almroth Wright has suggested placing gauze, wrung out of 5 per cent salt solution, between the muscles and connective tissue planes, in order to encourage the outpouring of lymph. This has appeared to be an excellent method of treatment.

Lieut. Col. C. B. Lawson, of the Royal Army Medical Corps, and H. Beckwith Whitehouse, in a preliminary communication from Rouen on "The Treatment of Acute Emphysematous Gangrene," have a suggestion with regard to some of the worst of these cases that is most interesting. Patients suffering from the condition who appeared almost in extremis when they entered the hospital with extremely foul wounds, the tissues around edematous, devitalized and emphysematous, with typical blebs on the skin surrounding the wound, have been treated by a new method with hydrogen peroxid with life-saving results. Small incisions were made into the healthy tissues above the infected area, and through these punctures hydrogen peroxid was pumped into the subcutaneous and subfascial planes by means of a Higginson syringe. The evolution of oxygen was rapid, and the stump soon assumed enormous proportions, emitting a resonant note on percussion. At once the spread of gangrene was arrested. The existing gangrene sloughed away, but the surrounding skin assumed its normal look and the circulation was reestablished. There was uninterrupted recovery. The cases reported cured are few, but were very severe, and the results secured are insignificant. Care must be taken to obviate shock and trauma of veins. There is some risk of air embolism, but so far no serious results have been noted. The hydrogen peroxid must be neutral in reaction. It should be injected warm and used plentifully.

Absolutely the best application to wounds in the field has been iodine. This has been used very freely. In spite of this copious use, no ill results have been seen from painting even very large wounds with iodine. A 2.5 per cent alcoholic solution of iodine has proved

much more effective than any other antiseptic used. As Mr. Morgan, of London, who had experience with the wounded in Namur, says:

One often felt that if only a small vial of iodine could have been poured on the wound (before the first dressing was applied) it would have been so much more efficacious.

Even with all the encouraging reports, the feeling is brought poignantly home to the reader that organization for the killing and maiming of men has far outdistanced that for caring for them after the maiming process has finished its work. This is not the fault of the medical services, but of the greater interest of Government authorities in the development of the killing and maiming side of war rather than that of the preservation of the wounded. Perhaps some day it will be different.—(A. M. F.)

DAVIS, J. S., and HUNNICUTT, J. A. **The osteogenic power of periosteum; with a note on bone transplantation. An experimental study.** Bull. Johns Hopkins Hosp., March, 1915.

In the introductory remarks mention is made of Macewen's monograph, in which the experiments seemed to show that periosteum was not a bone-producing tissue, but that its function was simply that of a limiting membrane. Following this there were many papers by different investigators; some agreed with Macewen and others did not. The authors state they approached the subject with unbiased minds. Many of Macewen's experiments were repeated. One hundred and fifty-seven experiments were done on 50 dogs and 17 rabbits. A very careful surgical technic was carried out in each case and "the results were controlled by careful dissection and by X-ray and microscopic examinations."

The paper is a very masterly one and would seem to be almost the last word regarding the discussion as to whether it is or is not advisable to have periosteum on a bone graft. An abstract of this nature will indicate only to a very slight degree the amount of care taken and work done in the experiments made. Only the important features of results obtained will be mentioned. In order to be able to compare the results the experiments will have to be mentioned under the groups and subheads as given in the original article.

GROUP I.—THE TRANSPLANTATION OF FREE FLAPS OF PERIOSTEUM.

(A) The transplantation of free periosteum without bone particles into the muscle or subcutaneous tissue of the same animal.

Twenty-one experiments were made. In no instance could any growth of bone be detected.

(B) The transplantation of free periosteum without bone particles into the muscle or subcutaneous tissue of another animal of the same species.

Five experiments were made. In no instance was any growth of bone detected.

(C) The injection into the soft parts of small bits of periosteum, without bone particles, in suspension.

Six experiments were made. In one a single oblong bit of calcified tissue was found; but this was of doubtful origin as it was distant from the point injected. In five no bone formation could be demonstrated.

These three groups show that neither free auto- nor iso-periosteum has the power of bone production.

(D) The transplantation of free periosteum, with thin bone shavings attached, into soft parts of the same animal.

Seven experiments were made. In each experiment there was definite bone formation.

This group shows definitely that free periosteal flaps with bone shavings attached produce new bone.

GROUP II.—THE TRANSPLANTATION OF PEDUNCULATED FLAPS OF PERIOSTEUM.

(A) The transplantation of pedunculated flaps of periosteum without bone particles into or around adjacent muscles.

Four experiments were made. There was no bone formation from the periosteum, though the flap was still attached to bone itself.

(B) The transplantation of pedunculated flaps of periosteum, with a thin film of bone attached, into adjacent soft parts.

Eight experiments were made. In each experiment the bone-periosteal flap lived and formed new bone.

GROUP III.—THE SUBPERIOSTEAL RESECTION OF BONE, THE PERIOSTEAL TUBE, AS FAR AS POSSIBLE, BEING LEFT UNDISTURBED.

Eleven experiments were made. In eight, sections of rib and in three, sections of radius were removed. Metal caps were placed on the bone stumps under the periosteum in three experiments.

In the cases of partial rib resection, also in two of the radial experiments, in which only a section of bone was removed, the results showed that the new bone growth took place from the stumps of bone and not from the periosteal tube.

In one radial experiment the entire radius with its articular cartilages was removed, especial care being taken not to leave any bone particles. After 129 days there was no bone growth. This shows

that unless bone particles are present in the periosteal tube after subperiosteal resection no bone is produced except from the bone stumps.

In one case where metal caps were used there was no bone growth; in the others there was some growth from stumps around the caps, but none from the periosteal tube.

GROUP IV.—THE TRANSPLANTATION OF BONE AND OTHER SUBSTANCES INTO THE PERIOSTEAL TUBE AFTER PARTIAL SUBPERIOSTEAL RESECTION OF A RIB.

Twenty-one experiments were made. From these it was concluded that either autobone or isobone, without periosteum, when transplanted into a periosteal tube after subperiosteal resection of a portion of a rib, will cause a marked stimulation of bone growth, both from rib ends and periosteum. Transplants covered with periosteum, and also foreign bodies, such as a twisted piece of silver wire, a roll of insoluble gelatine, seem to have no effect on the periosteum, but in each instance there was stimulation of growth from the rib ends. In no instance could new bone formation be demonstrated from the grafts themselves.

GROUP V.—SILVER-WIRE EXPERIMENTS.

Fourteen experiments were made as follows: Silver wire wrapped snugly around the bone after removal of periosteum, over intact periosteum, subperiosteally, bone curetted, bone scraped, and no precaution taken against infection. From these experiments it was concluded that little, if any, new bone formed from the surface of bone after removal of periosteum unless the bone itself was irritated mechanically or by infection; that absorption occurred when the wire was wrapped snugly around bone over the periosteum and at times when around denuded bone; that little or no new bone was formed when wire was applied subperiosteally. The most extensive growth of new bone around the wire occurred when no precautions were taken against infection and when the bone was curetted after removal of the periosteum.

The author states that he has noticed clinically where silver wire was used for suturing bones that there was usually absorption beneath the wire rather than new bone formation over it.

GROUP VI.—THE IMPLANTATION OF BONE AND ALSO PERIOSTEUM INTO PREPARED DEFECTS IN THE SKULL.

Nine experiments were made. The transplants consisted of auto-periosteum, autorib without periosteum, autorib cut into bits, isorib. They were placed on the dura in each instance. There was prolifera-

tion of bone from the transplants without periosteum, as well as from the edges of the defects, this being especially noticeable when small fragments were used, as these presented a larger raw surface. The new bone seemed to come from the cut surfaces rather than from the surface stripped of periosteum. When periosteum absolutely free of bone particles was used no new bone was formed. When isografts were used they were replaced by new bone from the edges following the line of grafts. The edges of the defect were stimulated equally as well by iso- as by auto-transplants. The closure of the defect was equally as good in each.

GROUP VII.—AUTOBONE IN SOFT PARTS.

Twenty-five experiments were made. In 8 the bone was transplanted with its periosteum, in 17 without periosteum. The results showed that absorption was taking place in each instance. This was slower, however, in bone with periosteum, as in these cases the periosteum seemed to have a certain protective action. In only two cases was there any attempt at new bone formation, and in these absorption was also taking place.

GROUP VIII.—ISOBONE IN SOFT PARTS.

Nine experiments were made. Absorption was taking place in all, and in no instance was there attempt at new bone formation.

GROUP IX.—AUTOBONE IN BONE DEFECT.

Eight experiments were made. The results showed that autobone, with or without periosteum, as a single piece or in small bits may be successfully used to fill bone defects. The transplants tend to assume the size of the bone into which they are transplanted. In some instances fascia was used very successfully as a limiting membrane.

GROUP X.—ISOBONE IN BONE DEFECT.

Seven experiments were made. The results showed that isobone stimulates the bone stumps to growth of new bone; that it acts as a sort of scaffold for growth of new bone; that there is shortening of the bone into which the transplant is placed; that the transplant is ultimately absorbed.

GROUP XI.—MISCELLANEOUS EXPERIMENTS.

Some of these showed the remarkably slow growth of bone from bone stumps after a resection of a portion of bone with its peri-

osteum. The outgrowth after six months was very little more than after six weeks. In comparison the growth was very rapid when autobone or isobone was placed in the defect.

CONCLUSIONS.

These are concise, embrace well the whole subject, and are consequently copied verbatim.

Free periosteal transplants did not produce bone in the large majority of experiments, even though osteoblasts were adherent to the transplants. Pedunculated flaps of periosteum did not produce new bone. Free periosteal transplants and pedunculated periosteal flaps, with bone shaving attached, produced bone in each experiment. From this we may surmise that bone particles had been accidentally transplanted in those experiments in which bone was found after the transplantation of free periosteum.

The removal of periosteum had little, if any, effect on the nutrition of a bone. The surface from which the periosteum was removed showed very little overgrowth of bone, unless there had been considerable irritation of that surface, either by trauma or by infection. The area from which the periosteum had been taken was covered with a thin, very adherent fibrous membrane, or the muscle tissue was adherent to the denuded area.

Absorption occurred when a silver ring was snugly applied around a bone over the periosteum, and also at times when it was applied around denuded bone. There was no new bone formed from either the periosteum or bone when a silver ring was placed around a bone beneath the periosteum.

Both autobone and isobone, without periosteum, were effective in repairing skull defects. Autobone and isobone, without periosteum, when transplanted into the periosteal tube after subperiosteal resection of a rib, caused stimulation of bone growth from the periosteum and also from the rib ends.

Transplants, covered with periosteum and also foreign bodies, stimulated bone growth only from the rib ends. Transplants of the same size in a periosteal tube, after subperiosteal resection, under exactly the same conditions, acted quite differently.

After subperiosteal resection of a portion of a bone, the growth of bone in repairing the defect was from the bone stumps, the periosteum acting as a limiting membrane.

Autobone, both with and without periosteum, lived and was successfully transplanted to fill defects in bone. Clinically, it is advisable to transplant bone covered, in part at least, with periosteum.

Isobone in a bone defect acted as a scaffold for the growth of new bone from the living bone stumps, but there was ultimate absorption of the transplant.

Autobone, both with and without periosteum, was absorbed when transplanted into soft parts. The periosteum seemed to have some protective influence against early absorption. The fate of those transplants which had grown together and produced new bone is doubtful, but as absorption was going on, and as the tendency of free bone in the soft parts was to be absorbed, it seems probable that absorption would eventually have occurred. The same may be said of isobone in soft parts, except that in no instance was any new bone formed from the transplant.—(E. H. H. O.)

JUDD, E. S. The technic of cholecystectomy. *Ann. Surg.*, March, 1915.

Attention is called to the two great dangers in this operation—hemorrhage from the cystic artery and injury to the common bile duct. Hemorrhage may occur at time of operation or later from slipping of ligature. Injury to the common duct may occur when clamping the cystic duct or through efforts to catch the cystic artery if the ligature slips. Cholecystectomy is best accomplished from below upward. The dissection is easier and circulation is controlled at the start.

The following steps in the operation, as given by the author, are quoted verbatim. They are accompanied by excellent illustrations.

Step 1.—The abdominal incision instead of being made over the normal location of the gall-bladder is made high and close to the midline, usually extending to the ensiform. Through this high incision, in most cases, much of the right lobe of the liver can be rolled out by using the gall-bladder as a tractor. If the liver is adherent to the parietal peritoneum, the adhesions should be freed before proceeding further, as the operation is much simpler if the liver can be displaced.

Step 2.—An assistant gently tracts on the pair of forceps which has caught the fundus of the gall-bladder. The neck of the gall-bladder is then caught with a second pair of forceps, and this part of the gall-bladder and the cystic duct are pulled away from the surface of the liver. Considerable fat and edematous tissue may be encountered in this region, especially if there is an empyema of the gall-bladder; but this fatty tissue can be cleared away from the duct by a blunt dissection. Tracing down the cystic duct as a guide, the common duct is usually readily exposed by this traction on the neck of the gall-bladder. The neck of the gall-bladder and the lowest part of the body of the gall-bladder frequently lie alongside the cystic duct, so that when this is dissected out and pulled up the cystic duct is easily separated from the surface of the liver.

Step 3.—The cystic duct and cystic artery are kept together. After these are completely freed from the surrounding tissues for

the distance of a half-inch to an inch, they are caught together in two clamps and divided between the clamps. It is this particular step in the technic that I wish to emphasize. If the dissection at this point is carried out as described, the cystic artery is definitely ligated without tension and the common duct can not be injured, because the grasp of the forceps includes nothing but the cystic duct and artery.

Step 4.—After dividing the duct and vessels between clamps, the end of the gall-bladder just cut off from the duct is pulled upward with a little tension, thus exposing the peritoneal folds and the communicating vessels at this point. These vessels are caught and the gall-bladder is dissected from its attachments to the liver.

Step 5.—The stump of the cystic duct and the cystic artery are now ligated with one ligature of ordinary catgut. It will be noted that this is done before the gall-bladder has been entirely removed. This attached gall-bladder makes an ideal retractor, and traction on it gives good exposure for the ligation of the duct and artery. As soon as these structures are ligated the ligature is cut and they are allowed to drop back free from the liver.

Step 6.—A suture is now started through the cut edges of the peritoneal folds from which the neck of the gall-bladder has been removed. This is continued upward to the edge of the liver and is made to cover as well as possible the raw surface left on the liver. The gall-bladder is removed a little at a time and then a few stitches applied. If there is oozing from the surface of the liver, one or two extra stitches may be necessary, though usually a little pressure and relaxation of tension will control it.

Step 7.—A small cigarette drain is placed down to the cystic duct and brought out so it will lie in the fissure from which the gall-bladder was removed.

This technic does not vary in many essentials from that often described. The important step in the operation is the complete freeing of the cystic duct before it is cut. Sometimes this is difficult, though it can be done in practically every case.—(E. H. H. O.)

The German use of asphyxiating gases. Brit. Med. Jour., May 1, 1915.

Such men as Haldane, H. B. Baker, and Herringham have been investigating the character of the asphyxiating gases, the latest development in the trench warfare.

The gas appears to be evolved in some special apparatus and to be projected from a tube toward the trenches of the allies when the wind is blowing toward these from the Germans. It appears in the form of a yellowish-brown smoke, which floats slowly along close to the ground and is easily visible from a considerable distance.

And again:

He had observed first a white smoke rising from the German trenches to a height of about 3 feet, and then in front of the white smoke appeared a greenish cloud, not rising more than about 7 feet, when it had drifted along the ground to the British trenches. * * * He saw 24 men lying dead from the effects of the gas on a small stretch of road leading from the advanced trenches to the supports.

The symptoms and post-mortem findings are those of an acute irritant bronchitis and its secondary effects. The indications are that the gases evolved are either chlorin or bromin, or both; both are heavier than air and dangerous to life in quite low admixtures.

Dr. Haldane states that there are also facts pointing to the use in German shells of other irritant substances. The effects are not those of any of the ordinary products of combustion of explosives.—(R. C. R.)

DORRANCE, G. M. Transfusion by the syringe method. *Am. Jour. Obst.*, May, 1915.

Dorrance says for the syringe method that (1) there is no chance for carrying infection from the infected recipient to the healthy donor; (2) one is sure that the procedure is successful (undoubtedly many of the failures are due to no blood passing the connection); (3) a known quantity of blood is transfused; (4) the technic is easy enough for any physician to perform.

The instruments required are as follows: All-glass syringes, four of 50 c. c. each, two of 100 c. c. each; two small and two large cannulas with round pointed trocars; and two sets of the usual instruments for venesection. The operation is carried out as a major procedure with great attention to detail of arrangement of tables, instruments, and assistants, of whom there should be no stint.

It is considered safer, surer, and better surgical technic to expose the vein under local anesthesia rather than introduce the trocar through the skin. Cannulas and syringes are freely lubricated with sterile warm melted vaseline. The median cephalic is exposed in each by operator and assistant, and vaseline coated trocar and cannula introduced, in the case of donor with the point toward the fingers, in the recipient toward the heart. The nurse now fills a 50 c. c. syringe with fresh warm salt solution, expresses all the air and salt solution excepting 10 c. c., and hands it to the operator, who then extracts the trocar from the donor's cannula, introduces the tip of the syringe into the cannula, and gradually pulls on the plunger till full. This is then passed to the assistant, who reverses the process and hands the emptied syringe to the nurse to be washed and lubricated again.

The special points in technic are gentleness, cleanliness, and well-vaselined cannulas and syringes. Be sure to have sufficient assistants.—(R. C. R.)

MUIR, J. R. **The North Sea action of January 24.** Jour. Roy. Nav. Med. Service, 1, No. 2, April, 1915.

Staff Surg. Muir reports the details of the medical arrangements on board H. M. S. *Tiger* and the manner in which they were carried out during the above action.

The *Tiger* is a 28,000 ton battle cruiser, 28 knots, eight 13.5-inch guns, and was finished in 1914. She, with the *Lion*, led in the pursuit of the German squadron. The general arrangements before action comprised a forward "distributing station," an after distributing station, two first-aid men with a Neil Robertson stretcher in each turret, and one of the 6-inch gun's crew trained in first-aid at each gun. Each turret and gun station was supplied with first-aid bag, and in addition the turrets had a hypodermic syringe with bottle of morphin solution.

The "distributing" or battle stations were behind turrets B and X and protected also by the 6-inch armor of the ship's side. The complement of the forward station was the staff surgeon, 1 surgeon, fleet paymaster, chaplain, 1 sick-berth steward, 2 sick-berth attendants, 1 chief and 1 third writer, 1 cook, and 1 officer's steward. Aft were 1 surgeon, 1 second sick-berth steward, 2 sick-berth attendants, 2 cooks, 2 officer's stewards, and 1 writer.

The action commenced at 9.03 a. m. and continued until approximately 1 p. m. It was found that violent concussion from the adjacent turrets prevented more than very elementary treatment. No assistance was extended to the turrets; the wounded from one of the turrets which experienced the explosion of a 12-inch shell found their way readily to the dressing station unassisted.

About 4 p. m. permission was received to open the sick bay, which was found uninjured, save some breakage from concussion. As they expected to reach port that night no operative work was undertaken with one exception.

All wounds were treated either with iodin or pure carbolic, the skin surface being washed with rectified spirit before the application of the iodin. It was believed that the pure carbolic caused dry gangrene to take place in a large proportion of a large flap wound on the inner side of a knee.

The burns were treated with picric acid dressings, but became very rapidly septic.

The explosion of the shells caused a black, oily, sooty deposit in the skin of nearly all these patients. This was readily removed with turpentine, but nothing else seemed to have any effect. Soap and water and spirit were useless.—(R. C. R.)

CHEYNE, W. WATSON, BASSETT-SMITH, P. W., and EDMUNDS, A. **The best method of treating wounds sustained in action, especially during the early period after their infliction.** Jour. Roy. Nav. Med. Service, 1, No. 2, April, 1915.

Although this is only a preliminary report, the results so far are most encouraging, and already it seems worth while to apply the method to wounds in war. That certain substances would diffuse through blood, tissues, and agar was of course known, but in what way this diffusion takes place, and how antiseptics act in relation to the growth of bacteria at a distance had not been worked out. It was found that quite a number of substances can diffuse through a considerable thickness of material and influence the growth of the bacteria which they may meet within their course. The radius within which they act seems to depend to a considerable extent on the concentration and the quantity of the antiseptic at the site from which it radiates, on the base with which it is combined, and on the extent of surface to which it is applied.

Of the substances which were tested, boric and salicylic acids, cresol, and carbolic acid seem to be the most useful for this purpose; it may, however, quite well happen that others which have not yet been studied would do better.

In the experimental work boric and salicylic acid have not acted so well in the form of pastes as in powder. In a paste with lanolin and wax it does not diffuse at all well, and in the experiments on animals the paste with gum tragacanth, which diffuses very well in agar, did not act nearly so well as the powder. But, as was said at the beginning, a powder is not so satisfactory as a paste in wounds in war, because it would be very difficult to apply it to the whole interior of the wound, and it would also be very apt to be carried away by the blood and be lost. It is therefore proposed that borsal (salicylic acid and boric acid in equal parts) should be used as a powder and thickly dusted over the wounds as far as possible, and that its action should be reinforced by the injection of cresol paste (20 per cent in lanolin and wax base) into the interior of the wound in various directions. As a matter of fact, the soiling of wounds with earth is not likely to extend to any great depth, and the borsal powdered over a wound, especially if it is well open and the bleeding has stopped, will probably overtake the severe earth infection, while the septic organisms carried on farther will be dealt with by the cresol. At any rate, the growth of organisms will be inhibited

over a large area till the patient reaches the dressing station, where the wound can be opened up and more thoroughly attended to. It would, of course, be much better if one could attain this object with a single antiseptic, and it is proposed to make further experiments in the hope of attaining a satisfactory paste with salicylic acid; but in the meantime the combination which is suggested promises to be of considerable value in these cases.

It is proposed to issue this combination to the Navy in the form of pepper pots containing about 1 ounce of borsal in each and of paint tubes containing one-half ounce of 20 per cent cresol paste, the tubes being provided with nozzles about 2 inches in length, which are screwed on the ends of the paint tubes so that they can be introduced into the depths of the wound in various directions. This tube should only be used on one patient and then thrown away. In the ships a sufficient quantity would be issued to deal with the probable number of wounded; in the case of naval contingents acting on shore each man would have a pepper pot and a tube in his field dressing. In the case of a wound at the front the first thing is, of course, to stay the bleeding as much as possible and then to powder the whole surface thickly. The cresol tube is then introduced into the wound and small quantities of the contents are squeezed into it in various directions, endeavoring as far as possible to leave small portions of the paste scattered over the whole area of the wound, not more than 1 inch apart. Some of the paste should also be smeared over the skin around the wound, and after a final dusting with the borsal powder the emergency dressing is applied. This can all be done quite quickly, and then the patient can wait till such time as the wound can be more thoroughly attended to.—(R. C. R.)

HYGIENE AND SANITATION.

C. N. FISKE, Surgeon, and R. C. RANDELL, Passed Assistant Surgeon, United States Navy.

CUMMINS S. L. The possibility of conveying typhoid fever by clothing, contaminated food, and soiled fingers. Jour. Roy. Army Med. Corps., London, xx, No. 6, pp. 635-655.

In an article on the causation and prevention of enteric fever in military service, with special reference to the importance of typhoid carriers, experimental data are reported which demonstrate the possibility of conveying this disease by means of the clothing and the soiled fingers of typhoid carriers as well as the results of experiments which have to do with the possibility of the survival of the living *Bacillus typhosus* in foods and of the infection of foods by typhoid carriers.

It is obvious that the contamination of food before cooking will usually be rendered harmless when the temperature of the food is raised. Contamination after cooking will be very dangerous, even if the food is consumed immediately after the contamination takes place. The fingers of a typhoid carrier may be the vehicles of millions of germs. A single drop of urine * * * may contain anywhere from 1,000,000 to 300,000,000 typhoid bacilli, and these will multiply in soup at the temperature of serving. Again, soup contaminated, allowed to cool, and "warmed up" again to a temperature just pleasant for drinking may be very dangerous, especially if the soup has been covered to keep out dust in the interim.—(E. W. BROWN.)

WINSLOW, C.-E. A. and BROWNE, W. W. **The microbic content of indoor and outdoor air.** *Mo. Weather Rev.*, xlii (1914), No. 7, pp. 452-453.

Examination of microbes developing at 20° C. from outdoor air in suburban districts shows generally under 50 per cubic foot and rarely over 100, the count at 37° C. for such air is about half that at 20° C. and rarely over 50 per cubic foot. The number of mouth streptococci in such air is small—in the neighborhood of 10 per 100 cubic feet. The air from more remote regions would no doubt show still smaller numbers.

The air of city streets shows a slightly higher number of microbes, but the general relations are much the same in all the respects noted above.

The air of occupied spaces shows, as might be expected, larger average numbers of bacteria and much greater fluctuations. The 20° count may average over 100 microbes per cubic foot, as in the factories studied, and may reach 700 or more, as in some of the offices. The 37° count averaged over 50 both in factories and in offices and was nearly as high as the 20° count in the latter case. A few very high 37° counts were obtained, two between 1,000 and 2,000 in offices and one of 5,200 in the country, the latter clearly abnormal. Mouth streptococci are much more abundant in indoor air, ranging from 20 to 40 per 100 cubic feet of air, and the results bear out the conclusion that the number of these organisms furnishes a good measure of mouth pollution due to concentration of population in confined spaces.—(E. W. BROWN.)

WINSLOW, C.-E. A., KIMBALL, D. D., LEE, F. S., MILLER, J. A., PHELPS, E. B., THORNDIKE, E. L., and PALMER, G. T. **Some results of the first year's work of the New York State Commission on Ventilation.** *Am. Jour. Pub. Health*, v, No. 2, Feb., 1915.

Of this commission all but the last named, chief of investigating staff, served without pay, while the operating funds and facilities were provided by Mrs. Elizabeth Milbank Anderson and the Association for Improving the Conditions of the Poor of New York City. The governor in appointing the commission emphasized that the problem was beyond the engineers because the fundamental points of proper temperature, humidity, and their permissible variations for schools and other public buildings had not yet been scientifically determined.

In view of the modern researches of Flügge, Haldane, Hill, Benedict, and others, which have "revolutionized" the physiology of ventilation indicating that "heat rather than chemical poisoning is the cause of discomfort in ill-ventilated rooms," and "that the problem is physical rather than chemical, cutaneous rather than respiratory," the commission decided that "there are four atmospheric conditions which produce, or are supposed to produce, unfavorable effects upon those exposed to them: High heat, alone or combined with high humidity, chemical effluvia of various sorts resulting from human occupancy, drafts, or exposure to cold in an air of unduly low humidity."

The commission set itself to further study of the following eight biological and mechanical problems, the first four of which are fundamental and the last four subsidiary; they are being investigated in order of sequence, the first two occupying the first year's work:

1. It has been clearly shown by others that very high temperatures combined with high humidities, corresponding to a wet bulb temperature of 78° and over, produce not only discomfort but definite symptoms of physiological derangement, such as a rise in body temperature and pulse rate and a fall in blood pressure. It has not been known whether such symptoms were present under less extreme conditions of overheating, such as ordinarily obtain in occupied rooms, whether they were accompanied by more profound derangements in metabolic processes, or to what extent they affect physical and mental efficiency.

2. The trend of physiological research has been to throw serious doubt upon any effect whatever of carbon dioxid, organic effluvia, and other chemical constituents of the air of occupied rooms. This problem, too, required further study before final judgment could be pronounced.

3. It is believed by many physicians and laymen that chill from exposure to drafts and low temperatures, particularly when it affects the habitual dweller in an overheated atmosphere, is a primary factor in inducing colds, bronchitis, pneumonia, and other bacterial infections. On the other hand, equally qualified observers maintain that the temperature factor in such disease is a relatively minor one. It is important to know, not as an opinion but as a result of definitely planned experiments, how serious living in warm rooms with subsequent exposure to chill really is in its effect upon the human mechanism.

4. Finally, it is claimed in many quarters that dry air *per se* at either high or moderate temperatures is harmful to the mucous membranes, promoting infections and glandular enlargement and conduces to nervousness and interferes with concentrated work. So far as the authors are aware this opinion rests on no definite, tangible evidence, but it is sufficiently plausible to demand careful study.

5. First of all, among the mechanical problems, is the question whether the admission of untempered outdoor air through open windows or through special deflecting window ventilators or through cloth screens is an adequate and sufficient mode of air conditioning. It is claimed that such simple methods of ventilation are superior to the most elaborate ducts and fans; and it is claimed with equal vigor by others that they are inadequate and insufficient for the ordinary school or factory. It is important to determine the limit of usefulness of such devices.

6. If, and when, the admission of tempered air is necessary, the next question which arises is as to whether it is most effective and economical to supply it from local inlets, supplied with heating coils, by gravity or to distribute it from a central point by fans.

7. The answer to both of the last questions will be affected by the conclusions reached as to the value and field of application of the new process of recirculation or using over and over of the same air, after washing and conditioning, since if this procedure proves generally satisfactory it may easily prove to have important economic advantages over any other system.

8. Finally there remain to be worked out details of the most efficient practice in air distribution within the room, the respective advantages of upward and downward and lateral flow and the proper proportion of inlets to occupants under various conditions.

The experiments thus far carried out in specially constructed and equipped rooms at the College of the City of New York are calculated in number and duration of observations, subjects, physiological, and psychological tests to give finality to the conclusions made. The following are "tentatively" conclusive findings on the first two problems, which might, of course, be susceptible of slight modification as further investigations are developed. It is regretted that thus far the objective results of circulating air *per se* are inconclusive, although the subjective observations frankly favor it; this is possibly due to the small amount of skin area, head, and neck exposed compared with that of stokers in firerooms. No final opinions will be given until the unprecedented full and detailed investigations are completed.

1. A very high room temperature such as 86° F. with 80 per cent relative humidity produces slight but distinct elevation of body temperature, an increase in reclining heart rate, an increase in the excess of standing over reclining heart rate, a very slight lowering of systolic blood pressure, and a marked fall in the Crampton value.¹

¹ The Crampton value, suggested by Dr. C. W. Crampton as a measure of vasomotor efficiency, expresses the relation between the rise in heart beat and the decrease or increase in blood pressure in passing from a reclining to a standing position.

2. Moderately high room temperature, 75° with 50 per cent relative humidity, has all the effects noted above, although, of course, in less degree than the extreme temperature condition.

3. Even the extreme room temperature of 86° with 80 per cent relative humidity shows no effect upon rate of respiration, dead space in the lungs, acidosis of the blood, dissociation of oxyhemoglobin, respiratory quotient, rate of heat production, rate of digestion, carbohydrate or protein metabolism, concentration of the urine, and skin sensitivity.

4. The power to do either mental or physical work, measured by the quantity and quality of the product by subjects doing their utmost, is not at all diminished by a room temperature of 86° with 80 per cent relative humidity.

5. On the other hand, the inclination to do physical work and the inclination to do mental work are diminished by sufficiently high room temperatures. So far as physical work is concerned the tests show a decrease in actual work performed, when the subject had a choice between working or not working, of 15 per cent under the 75° condition and of 37 per cent under the 86° condition, as compared in each case with 68°.

6. Stagnant air at the same temperature as fresh air, even when it contains 20 or more parts of carbon dioxid and all the organic and other substances in the breathed air of occupied rooms has, so far, shown no effect on any of the physiological responses listed above under 1 and 3, nor on the power or inclination to do physical or mental work, nor on the sensations of comfort of the subjects breathing it.

7. On the other hand, the appetite for food of subjects exposed to such stagnant air may be slightly reduced.

8. These experiments seem to indicate that overheated rooms are not only uncomfortable, but produce well-marked effects upon the heat-regulating and circulatory systems of the body and materially reduce the inclination of occupants to do physical work. The most important effects of "bad air" are due to its high temperature, and the effects of even a slightly elevated room temperature, such as 75°, are sufficiently clear and important to warrant careful precautions against overheating.

9. The chemical changes in the breathed air of occupied rooms are of comparatively minor importance, although the substances present in such air may exert a slight decrease in the appetite for food.—(C. N. FISKE and E. W. BROWN.)

FOULDS, M. F. Tincture of iodine and the prevention of venereal disease. Jour. Roy. Army Med. Corps, London, xxiv, No. 1, Jan., 1915.

In a brief clinical article the author advises "all men to buy a small rubber-corked half ounce bottle of tincture of iodine (1 in 40)

and a small camel's-hair brush and keep them in their hold-alls, and enlarge on the application of the iodine to all cuts, chaps, abrasions, blisters, etc., besides using it as a preventive against venereal disease." As soon as possible after intercourse the weak tincture is to be applied to the mucous surfaces of the glans penis and retracted prepuce and the small brush passed into the fossa navicularis; this to be followed by a second application 12 hours later. Fould states that "admissions for venereal disease have gone down," although he by no means claims that the iodine prophylactic should be given the credit. He incidentally remarks that the iodine used daily acts like a charm in the treatment of "venereal warts."—(C. N. F.)

AYERS, S. H., and JOHNSON, W. T., Jr. **Ability of colon bacilli to survive pasteurization.** Jour. Agric. Research, III, No. 5. February, 1915.

The thermal death point of 174 cultures of colon bacilli isolated from cow feces, milk and cream, human feces, flies, and cheese showed considerable variation when the cultures were heated in milk for 30 minutes under conditions similar to pasteurization.

The lethal temperature for all cultures was relatively low and 87.3 per cent of the 95 cultures which survived the pasteurizing temperature, 60° C., were destroyed at 62.8° C. (145° F.), which is evidently a critical temperature for colon bacilli. There remained 12 cultures not destroyed at 62.8°, and one of these was not destroyed on first heating to 65.6° (150° F.). It will be seen that the colon test is not a good index of efficiency of pasteurization unless a temperature of 65.6° C. is maintained for 30 minutes.—(C. N. F.)

SPIVAK, C. D. **The specific gravity of the human body.** Arch. Int. Med., xv, No. 4. Apr. 15, 1915.

The investigator, using a vertical immersion chamber of the least possible caliber, obtained 1.005, differing from the earliest experimenters of last century, whose figures are considered too low, and the more recent German figures, now believed to be too high. Spivak believes that body specific gravity will eventually prove of more value in medical anthropometry than stature, and that it will be an important factor in the ponderal index.—(C. N. F.)

HAMILTON, A. **Lead poisoning in the manufacture of storage batteries.** Bull. Bur. Lab. Stat., No. 165, December, 1914.

The making of storage batteries, or electric accumulators as they are called in every country except our own, is increasing in extent and importance everywhere. It is regarded as a very dangerous lead

trade and the Governments of Great Britain and other European countries have made strict regulations as to the sanitation of places in which such work is done and as to the methods to be employed in them, since experience has shown that in the absence of regulations lead poisoning among the workers is a very serious evil.

A storage battery is described as a collection of secondary cells, or accumulators, which, when once charged by an electric current, may be used for some time as the source of electricity.

The original type of storage battery, known as the Planté, consists of lead plates, which are usually corrugated or perforated to offer a larger surface for the chemical action of the charging agent. The Faure cell was constructed with the purpose of hastening these chemical changes.

For many years such cells were the only ones used for storage batteries, but of late the nickel-iron battery of Edison (the so-called alkaline battery) has been introduced and is said to be coming rapidly into general use. In this battery the positive plate consists of perforated steel tubes filled with nickel hydrate; the negative of perforated steel pockets filled with iron oxid. They are immersed in a bath of potassium hydroxid and charged, the nickel in the positive plate being changed to black nickel oxid and the iron oxid of the negative to spongy iron.

Edison batteries are, therefore, free from lead, but the Planté and Faure are lead batteries, and their manufacture involves the exposure of workmen to the dangers of lead poisoning.

By using precautions German and British employers have greatly reduced the amount of lead poisoning in factories of this kind. In the largest German factory the rate of poisoning in 1912 was 0.97 per 100 employed, and in Great Britain the rate for all factories during this same year was 3 per 100.

In the United States the five largest factories were during 1913 employing about 915 men in work which exposed them to lead. It has been possible to discover 164 cases of lead poisoning which occurred among the employees of these plants in this one year. This makes a rate of 17.9 per 100 employed.

The employees in this industry in the United States are for the greater part of foreign birth; many speak no English and are ignorant of the dangers of the work, or, if they recognize the danger, do not know how to protect themselves against it.

The difference between the American rate of lead poisoning and the British and German rates must be explained by the different standards of sanitation and management in this country as compared with those of European countries. None of the five large factories in the United States comes up to the British or German establishments in cleanliness or in the removal of fumes and dust, and only

one provides as careful medical supervision. Smaller factories in this country are even less well managed.

The three States in which the five largest factories are situated have already passed laws which cover this industry and provide safeguards for the men engaged in it, and if these laws are strictly enforced by intelligent factory inspectors there is no reason why our record of lead poisoning should not fall, as it has fallen under intelligent supervision in Great Britain and Germany.—(R. C. R.)

TROPICAL MEDICINE.

E. R. STITT, Medical Director, United States Navy.

STRONG, R. P., and TYZZER, E. R. Pathology of *verruca peruviana* (sixth report). From the Harvard School of Tropical Medicine. Am. Jour. Trop. Dis. and Prev. Med., ii, No. 10, April, 1915.

The smaller papular lesions of *verruca* are rounded or oval. Cut surface moist; serum and blood escape on section. Most acute cases show cut surface of tumor bright cherry-red above and grayer at base. Hand lens shows cut surface, smooth, moist, homogeneous, and very translucent. No blood-vessels recognizable by lens and no lobular appearance observable.

Some larger lesions (1.5 to 2 cm. in diameter) present different appearance, are rounded or dome-shaped. "Mulaire lesions" show at times skin appearance somewhat resembling onion skin, caused by skin becoming slightly dry and surface becoming traversed by multiple longitudinal lines. After removal these present a variegated appearance, being bluish, grayish, or purplish. The middle of larger tumor on section is moist and exudes blood and serum. Cut surface is generally dark cherry-red, with longitudinal gray lines; microscopically new-formed connective tissue is seen to account for this appearance. Yellowish-gray areas comprise more compact cellular portion of nodule, capillaries distinguished by unaided vision in larger lesions. Sometimes skin is quite adherent over tumor, and here cut section shows invasion of epithelium into depth of tumor for several millimeters, accounting for gray lines radiating from surface. Larger mulaire lesions sometimes show superficial ulceration with reddened surface. Appearance is modified by secondary infections with bacteria. Deep ulceration does not occur.

Lesions occur on skin, visible mucous membranes, lips, gums, conjunctivæ, and glans penis. Textbook descriptions usually state that the eruption occurs in the internal organs. This opinion the writers do not share. Anatomical changes which appear to have occurred in solid viscera are generally due to complications. Tuberculosis is often the responsible complication. The authors were able to show

unmistakably that many of these so-called internal verrugas were due to tubercle. It is evident, too, that other investigators who have studied these internal lesions have described conditions the histology of which was not that of the verruga tumor. From the study of a considerable amount of gross verruga material only two specimens of probable internal verrugas were found. One of these, a heart tumor, turned out to be a cestodal infection. Lesions from the other specimen (miliary nodules of pharynx and larynx) were very likely those of verruga, and represented an extension of the disease from the nose and mouth.

The descriptions of the histology of verruga nodules as given by many workers to date are epitomized and the writers' own investigations upon the histology of this interesting disease are as follows: Portions of the material collected from a variety of verruga lesions (early and late) were first fixed in a number of standard fixatives and studied, after staining by the several tissue stains and special-purpose stains.

Early lesions consist of newly formed blood-vessels lying in connective tissue, which becomes edematous. Edematous areas when developed are often poor in cells, though at different stages a variable number of lymphocytes, larger plasma-cells, and polynuclears are present. The early papule is rich in blood-cells, and free blood-cells are usually present. Newly formed blood-vessels are very numerous, the small caliber of the blood-vessel in comparison to the amount of endothelial protoplasm being remarkable. Endothelial cells in some cases form more than one layer, those outside continuing to proliferate, and often suggest occlusion of capillaries, with resulting swelling and proliferation of endothelium. Nuclei of endothelium often show mitosis. As lesion progresses these angioblasts proliferate as large islands of closely placed cells, in which the lumina of small blood-vessels are compressed and not visible. Few fibrils are detected between these cells. In and around these areas true fibroblasts are noted. The prevailing type of cell in the early nodule is the angioblast. Many other writers call it the fibroblast. Some speak of the prevailing cell as the plasma-cell. Some emphasize the "sarcoma cell" appearance, while others speak of the cell as specific for verruga. As one studies the early forms, the staining reactions, and progress of development and compares them with endothelial cells, it is evident they are angioblasts. No other condition gives such a striking endothelial proliferation as the early verruga nodule, and this distinguishes it from other pathological processes. Later fibroblasts invade the islands of angioblasts and deposit collagen fibers. In this way is resemblance to fibrosarcoma in a granuloma characterized by the early new formation of blood-vessels in edematous connective tissue, and by the marked proliferation

of angioblastic cells forming islands of closely placed cells, by the invasion of the connective tissue by lymphocytes, plasma-cells, and leukocytes, and as the lesion progresses by fibroblasts and collagen fibers.

The amount and character of connective tissue in the different lesions varies considerably, elastic fibers may at times be demonstrated. Number of spindle cells is greater in older nodules, giving them more a fibrosarcoma-like appearance. The number and size of blood-vessels and amount of free blood-cells varies in the smaller and larger lesions as does the edema. In subcutaneous nodules lymphocytic infiltration is more marked. Mulaire lesions often show no epithelial covering, surface being covered with an organized blood clot consisting of fibrin, polymorphonuclear leukocytes, and round cells. Bacteria are often present, and such lesions beneath the clot show often a cavernous structure. Edematous connective tissue in these areas is penetrated by thin-walled blood-vessels.

Extravasations of blood may show.

In the different tumors we may therefore find pictures resembling sometimes fibrosarcoma, sometimes myxosarcoma, and sometimes angioma. None of the previous histological studies have been based upon a sufficiently large amount of material to coordinate these several appearances.

No giant cells are present. Plasma-cells when present at periphery of lesions are lying in the edematous connective tissue. Mast-cells may occasionally be seen but the prevailing cell is the angioblast. This is more or less flattened, the nucleus large, vesicular, oval in shape, and does not stain deeply, being only fairly rich in chromatin and often is mitotic. This cell is found often in various stages of degeneration and vacuolation. Phagocytic endothelial cells containing red blood cells and debris are often seen.

Bacteria are absent from unbroken nodules. If the skin over the nodule is abraded, bacteria and yeasts may occur. Many degenerating endothelial cells showing granulation with degenerated nuclei are noted in sections. These granular cells are more common in lesions from monkeys than man. No protozoa nor other microorganisms could be detected in the cells.

The author thinks that the disease described for Brazil by Bassewitz under the title "*angiofibroma cutis circumscriptum contagiosum*" is perhaps clinically and histologically the same as *verruca peruviana*.—(C. S. BUTLER.)

HOWARD, R. The importance of tertiary yaws. Jour. Trop. Med., xviii, No. 3, Feb. 1, 1915.

The author has worked for a number of years in different parts of Central Africa, where there is heavy native infection with yaws.

He thinks that too little importance is given to the matter of tertiary yaws and cautions against the diagnosis usual under the circumstances of syphilis. The natives usually diagnose the condition accurately. Several native African names for yaws are given.

In the region around Zanzibar yaws is very common, in some districts from 25 to 50 per cent giving a history of having had the disease. Tertiary symptoms are common, the natives seeming to recognize their connection with the original attack. In districts visited since 1911 yaws seems to be a more recent introduction. Adults as well as children have the disease and tertiary lesions are common. A few cures with potassium iodid encouraged the belief on the part of the natives that these lesions were curable, so that on a second visit to the region more cases applied than could be comfortably handled. In all but about 1 per cent of cases of tertiary yaws potassium iodid serves to cure.

The author describes the frightful ulcerations and deformities caused by tertiary yaws. In the way of prophylaxis he thinks much might be done by establishing yaws hospitals. The percentage of untreated primary yaws cases which develop tertiary lesions is not known. He thinks that "gangosa" and "melung" are dependent upon antecedent yaws.

Foot yaws is cured by soaking the foot until the skin is soft and cutting away the thickened overhanging edge of skin with scissors, thus leaving a flat granulating surface at the bottom of the conical hole which has been cut in the thick sole. The relief of pain is similar to that from paring a corn and the ulcer gradually heals satisfactorily.

The writer concludes that: Tertiary yaws is an important, destructive, and widely spread disease occurring in patients who have suffered from primary yaws. Many of its manifestations are practically indistinguishable from those of tertiary syphilis. Hence, when yaws is known to occur in a community great care must be taken to eliminate its tertiary symptoms before pronouncing tertiary syphilis to be widely spread.

Rhinopharyngitis mutilans and a special form of leukoderma of the palms and soles are in many instances symptoms of tertiary yaws.—
(C. S. BUTLER.)

OZZARD, DR. The treatment of ancylostomiasis. Jour. Trop. Med., Apr. 15, 1915.

The author believes that thymol leaves much to be desired in the treatment of hookworm infection. He mentions a case of amebic dysentery in which there were numerous hookworm ova present. After treatment with emetin the ova disappeared, and none were

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present when the patient was discharged from the hospital. In 7 out of 13 cases he found that there were no ova in their stools on their discharge from the hospital after treatment by emetin. He thinks these results should stimulate further trials.

Oil of chenopodium is as good, if not better than thymol, and has certain advantages over the latter. It is not nearly so nauseous; there are no disagreeable after effects; it has no toxic properties when given in therapeutic doses.

The method of administration is as follows: The patient is starved for eight hours, at the end of which time he is given 1 ounce of Epsom salts. Two hours later 16 drops of the oil are given and repeated at two hourly intervals until three doses have been given. Some physicians give an ounce of castor oil two hours after the last dose. His results are much better with this treatment than they ever have been with thymol. He emphasizes the necessity of using hygienic measures, particularly the prevention of soil pollution, to insure success in ridding a district of hookworm.

NOTE.—It is interesting, in this connection, that Dr. Stiles now recommends the use of oil of chenopodium in the treatment of ancylostomiasis.—(A. B. CLIFFORD.)

STOTT, H. *Studies in malaria.* Indian Med. Gaz., January, February and March, 1915.

As regarded quinin prophylaxis, the author used quinin sulphate in acid solution, given three times weekly, in 15-grain doses, for 4½ months and later in 10-grain doses during a period of about 5 months. The dose was poured into each sepoy's mouth by the senior subassistant surgeon.

Of 3,931 soldiers taking quinin prophylactically there was an admission rate, for malaria, of 65.8 per 1,000 of strength, while of 3,906 soldiers not carrying out quinin prophylaxis the admission rate was 67.8 per 1,000. In other words, for each 500 men taking quinin prophylactically 1 was saved from an attack of malaria. There was little difference in the severity of attacks between those quininized and those not taking the prophylactic. There was also about the same rate for relapses in the two groups.

In discussing the use of temperature charts in malaria he notes that they aid chiefly in diagnosis of malaria and, to a certain degree, of the species of parasite causing it. To a lesser degree they give evidence of the course of the disease and response to treatment. Of practical value is the importance of taking temperatures repeatedly in doubtful cases. Charts which show a continuous or remittent type, when taken morning and evening, may show a frank intermittence if recorded every four hours. In a case where a chart

plotted at 8 a. m., noon, and 4 and 8 p. m. showed a remittent course, yet when recorded hourly showed a marked intermission every other day and on this point alone a diagnosis was made in a case in which all other means of diagnosis failed.

As regarded the algid type of perniciousness, he did not observe any well-marked case of a choleraic type. There were five cases of dysenteric type, but the author notes the difficulty of eliminating a complicating dysentery. One case of hemorrhagic type was noted where there was a severe epistaxis and the passing of stools containing bright red blood. One case of syncopal type was observed.

In connection with the common idea that malarial paroxysms come on in the forenoon, the author notes that of 793 paroxysms only 291 (37 per cent) took place between the hours of 8 a. m. and noon.

As to clinical course he noted all kinds of variations from the typical succession of cold, hot, and sweating stages. At times the rigor would be entirely absent and again the sweating stage would directly follow the blue coldness of the rigor. The headaches were usually frontal.

In connection with blood examinations he noted the importance in the increase in the percentage of large mononuclears during apyrexia. In 163 differential counts from malaria he obtained an average percentage of 21.6, while the average percentage of large mononuclears among nonmalarious natives was 10.—(E. R. S.)

CENCELLI, A. New theories and investigations concerning pellegra. *Lancet*, London, April 17, 1915.

The fact is brought out that the prophylactic measures instituted in Italy, as regarded the quality of maize, yielded but little result and that the foreign maize imported into Italy had no effect upon the increase or decrease of pellegra.

The views of Alessandrini, that pellegra was due to drinking waters which traverse or are stagnant on argillaceous soil, seemed to the pellegra commission, of which Senator Cencelli was president, as having the most probable explanation of the etiology of the disease.

The author notes that in the Province of Rome there seems to be no connection between a maize diet and pellegra; also that the disease is circumscribed and confined to determined localities; that there may be some connection between drinking water and the malady; and, finally, that there is apparently no connection between sucking insects and pellegra.

Alessandrini's views appear to establish the conclusion that pellegra is a chronic poisoning brought about by silica in colloidal solution. The rain water, either in the superficial or deep strata of the ground, reacts upon the clay. A colloidal silica-alumina compound

results, which, although in large part precipitated, yet in small part remains suspended as a finely divided colloid. The ingestion of this compound produces a mineral acidosis, and the view seems reasonable that pellagra is a disease due to the forced retention of mineral salts followed by an abnormal liberation of acid.

For the treatment of this acidosis Scala and Alessandrini recommend trisodium citrate. They also recommend the treatment of the affected water with small pieces of lime in the pipes and reservoirs.

It is noted that various animals, such as monkeys, dogs, guinea-pigs, and rabbits, were treated with the suspected water or by intra-peritoneal or subcutaneous injections of colloidal silica with the production of a clinical complex almost exactly corresponding to pellagra in man.

Curative treatment with the absolutely innocuous trisodium citrate gave highly satisfactory results when tried upon pellagra patients, as well as upon the experimental animals.—(E. R. S.)

SUMMA, DR. Immediate relapse in tertian malaria after energetic salvarsan treatment. Arch. f. Schiffs- u. Tropen-Hyg., 1915, xix, No. 4, p. 108.

This is a defense against attacks on previous similar reports by the author, Werner (ibid., No. 2, 1914), alleging that the recurrences could just as well have been new infections.

Several additional cases are reported bearing out the author's views on the uselessness of trying to combat malaria with salvarsan alone. Reinfections are excluded, as in the following:

Corpl. V., Sixth Company.—V. was discharged from the hospital at Windhuk on March 7, 1913, after six salvarsan injections, totaling 3.2 gm., and proceeded by train to Ghaus. This latter is 200 kilometers distant and 1,900 meters above the sea. Neither adult nor larval anophelinæ have been known to exist there, and no known case of malaria originating locally, although rains are abundant and troops constantly present. * * * On March 30 he came down again with a typical tertian case, established by clinical and laboratory diagnosis, the latter including macro-gametocytes and micro-gametocytes.—(R. C. R.)

PATHOLOGY, BACTERIOLOGY, AND ANIMAL PARASITOLOGY.

C. S. BUTLER, Surgeon, and A. B. CLIFFORD, Passed Assistant Surgeon, United States Navy.

JAMES, W. M. A study of the endamebas of man in the Panama Canal Zone. Ann. Trop. Med. and Parasit., July, 1914.

This study, extending over almost 200 pages, discusses the important literature, morphology and development of *Endameba tetragena*; morphology of the endamebas found in the Canal Zone;

classification of the endamebas of man found in the Canal Zone; technic of various methods used in fixing and staining; bibliography; plates. The writer has given to the work much painstaking and thorough study; details have been gone into carefully; technic has been stated clearly and concisely. The plates, occupying six full pages, are very beautiful. This study will prove to be an inspiration to those interested in the progress of tropical medicine.—(G. F. CLARK.)

THIELE, F. H., and EMBLETON, D. **Lipoids in immunity.** Jour. Path. and Bacteriol., January, 1915.

The writers quote the result of their previous work, showing that the lipoids contained in erythrocytes, tissue cells, and egg-yolk play no part in the production of various antibodies, such as lysins, agglutinins, precipitins, and those concerned in anaphylaxis. Fat-free antigens produced the same amount and variety of antibodies as the ordinary nonextracted antigens.

In the recent work they have also studied the action of phosphatids derived from tubercle bacilli. They give the following summary:

1. The hemolytic power of a serum bears no relationship to its lipolytic power. A hemolysin is not a lipase.

2. Antibodies can not be provoked against the ordinary tissue fats, lipoids, or phosphatids.

3. The phosphatids of the tubercle bacillus can, however, provoke antibody formation. Those produced are: Precipitins, Bordet-Gengou, anaphylactic antibodies. These are not strictly specific, but react not only with the specific antigen but with the whole or lipoid-free antigen from which the phosphatid was obtained.

4. Guinea-pigs can be rendered actively hypersensitive to the phosphatids of the tubercle bacillus by a previous inoculation with those phosphatids. Such animals are also hypersensitive to the proteins of the tubercle bacillus, and, vice versa, guinea-pigs sensitized with tubercle protein react mildly with the bacillary phosphatid.

5. The symptoms and mode of death occurring on the reinoculation of such hypersensitive animals are identical with those occurring in acute protein anaphylaxis.—(G. F. CLARK.)

THIELE, F. H., and EMBLETON, D. **The mechanism of antibody action.** Jour. Path. and Bacteriol., January, 1915.

As a result of the work of Ehrlich and his school the conception has become firmly rooted that complement does not behave like an enzyme, but works quantitatively and forms a direct firm combination with the antigen it attacks.

The authors investigated the subject under the following heads by means of various experiments with combinations of guinea-pig com-

plement, sheep's cells, and antishcep amboceptor: (1) Mode of action of complement; (2) mode of action of amboceptor; (3) effect on complement concentration with increasing amboceptor; (4) rate of hemolysis and complement concentration; (5) the alteration in the complement titer with increasing concentration of the antigen; (6) effect of temperature.

The summary is as follows:

1. The activity of complement depends solely on its concentration, not on the total amount exhibited. This holds all through when the antigen has been sensitized with only one dose of antibody. When, however, the antigen has been sensitized with several doses, the above holds after a certain degree of dilution. This degree of dilution varies with the amount of individual antibody.
 2. Amboceptor combines quantitatively with its homologous antigen, and its activity does not depend on its concentration.
 3. Increasing amboceptor diminishes to a certain degree the complement concentration necessary to produce lysis. Above a certain amount increase in the amount of amboceptor does not diminish the necessary complement concentration. It, however, greatly accelerates the rate of the reaction.
 4. In addition to requiring a certain concentration, complement must also be present in a certain minimal amount. It thus frequently occurs that the amount of complement necessary to produce complete lysis is the same in dilutions of 1, 2, 3, and more c. c.
 5. Study of the curves of complement activity shows that they are like those of enzyme action.
 6. With increasing concentration of the antigen more complement is necessary to produce complete lysis in standard time. This is opposed to the results of Scheller.
- The necessary increase is at first small, a fraction of the original unit; later, the increase with each successive dose of antigen is much greater, and ultimately becomes greater than and a multiple of the original unit.—(G. F. CLARK.)

Morr, F. W. The diagnosis and treatment of parenchymatous syphilis. Brit. Med. Jour., January 30, 1915.

In a series of 100 brains of patients, who during life presented signs and symptoms of general paralysis, spirochetes were found in 66 per cent by dark-ground illumination, confirmed by Fontana silver staining. The cortex of the brain was emulsified with normal salt solution. Dark-ground illumination was found to be the most rapid and satisfactory of all methods.

The writer quotes the work of Noguchi and others to show the difficulty of inoculating animals successfully with material from the brains of patients having general paralysis. He assumes that there may be a biological difference between the spirochetes of general paralysis and tabes and those of primary syphilis. He doubts the presence of spirochetes in tabes, although Noguchi was able to show their presence in 1 of 12 cases, for the reason that there is no myelitis resulting as occurs in general paralysis, where there

is a general diffuse encephalitis. Toxins possibly account for the changes in tabes.

His results in silver staining of sections were not satisfactory, but in one case, contrary to the findings of Noguchi, he was able to demonstrate a feltwork of spirochetes about an inflamed vessel.

He calls attention to the absence of defensive forces in cerebrospinal fluid and the power of the choroid plexus to prevent the passage of stains. These two factors have a marked influence on treatment.

Using the original Wassermann technic and also alcoholic extracts of human heart with cholesterol, a positive Wassermann test was found in the cerebrospinal fluid only when the case was one of general paralysis, tabes, or syphilitic disease of the central nervous system.

He states that his experience with treatment has been limited, but from literature and the evidence of the royal commission, together with laboratory experience, he concludes that degenerative forms of syphilis of the nervous system (especially general paralysis) have not been cured or greatly benefited by salvarsan or neosalvarsan, whether administered intravenously or intrathecally.—(G. F. CLARK.)

ROSENOW, E. C. The bacteriology of appendicitis and its production by intravenous injection of streptococci and colon bacilli. *Jour. Infect. Dis.*, March, 1915.

On account of the work of other writers and the author's observation that the intravenous injection of streptococci occasionally produced appendicitis in rabbits, he began a bacteriological study of cases of appendicitis and tonsillitis. Intravenous injections of streptococci, colon bacilli, and other organisms isolated were made into rabbits.

The summary of the work follows:

The results of the observations and experiments indicate that appendicitis, in the absence of foreign bodies, commonly is a hematogenous infection, secondary to some distant focus; that it develops when, for some reason or other, the organisms, usually streptococci, have acquired an elective affinity for the appendix and at the same time gain entrance into the circulation.

The results bear out my theory that a focus of infection is to be looked on not only as the place of entrance of bacteria, but also as the place where they may acquire the varying affinities necessary to infect distant organs and tissues.

From the results in animals it seems, as emphasized also by Heyde, Aschoff, and others, that appendicitis is a serious disease, not so much on account of the virulence of the infecting microorganisms as on account of the anatomy of the appendix favoring strangulation and thus the growth especially of facultative and strict anaerobes.

The importance of thorough search for and removal of possible foci of infection from which appendicitis may originate must be emphasized.

Finally, it may be pointed out that the frequent occurrence of appendicitis, at times almost in epidemic form when throat infections are particularly prevalent, now is easily understood.—(G. F. CLARK.)

WOLBACH, S. B. On the filterability and biology of spirochetes. Am. Jour. Trop. Dis. and Prev. Med., II, No. 8, Feb., 1915.

All filterable microorganisms are not necessarily beyond the limit of microscopic vision. That visible organisms may have a submicroscopic stage is to be considered. That an infective stage of relapsing fever spirochetes may pass through a filter lends support to the view that chromatin-like granules observed with those organisms represent a definite stage in the life history. This is important, as its proof would show the protozoal nature of spirochetes.

Spirocheta duttoni, morphology and distribution in ticks.—A series of infected *Ornithodoros moubata* was studied by means of sections specially stained. Teasing of tissues is liable to give wrong results as to localization. The author's results tend to support the view that the granules found in epithelial cells have no relation to spirochetes, and that these latter do not multiply in epithelial cells. Spirochetes migrate throughout all the organs and the ova. All the phenomena of transmission can be explained thus. Granules, coiled and encysted forms, are found in the muscular and connective tissues of the tick. These encysted forms have nothing to do with multiplication. *S. duttoni* can be forced through Berkefeld filters N and W under pressure. One such effort resulted in getting the organism free from bacteria. Further investigation of the filterability of the pathogenic spirochetes is not practicable.

Spirocheta elusa, morphology and biology.—Organism has terminal flagella, circular cross-section, and has permanent spiral form, hence more like treponema. It grows on sterile hay infusion (neutral or slightly acid). Also on hay infusion agar. Optimum, 30° C. Reaction unchanged by growth. Organism has morphology given above, plus rounded ends and terminal flagellae. Divides transversely. Cover glass preparations flatten considerably. Best staining with dilute carbol-fuchsin and Giemsa after osmic-acid fixation. Granules and lateral bud-like projections are prominent features. Similar in every way to appearance noted in pathogenic spirochetes and recently in *Treponema pallidum*. Attempts to show these coiled and encysted forms viable or more resistant failed. This evidence applies to similar forms seen in ticks with *S. duttoni*. It was shown that *S. elusa* passes through Berkefeld N and W filters as a spirochete. This is seen by examinations of the filtrate and also of specially prepared portions of the filter.

Spirocheta biflexa and a new filterable spiral organism from human feces are considered. The latter is cultivable and gives many of the appearances noted with the other spirochetes. It is easily filterable in from one and a half to three hours by gravity, coming through the filter as a spirochete.

The writer compares these organisms which he provisionally calls sprochetes with members of the genera spirillum, spirocheta, and treponema. They seem to partake of some of the characteristics of each of these genera and may require a separate genus. His conclusions are:

1. That the method of filtration as a means of separating spiral organisms from ordinary bacteria will probably hold good for other saprophytic and pathogenic spirochetes and allied microorganisms.

2. That organisms larger than many bacteria will pass the Berkefeld V, N, and W filters, namely, *Spirocheta duttoni* and the ones we have tentatively called *S. elusa*, *S. biflexa*, and the spiral organism from the colon of man, which is probably the organism commonly recognized in preparations as an intestinal spirochete.

3. That there is no evidence of spirochetes multiplying by any other method than single fission. It is certain that the granules, coiled forms, and swollen terminals of the spiral organisms cultivated by us are not capable of multiplication in any form—(C. S. B.)

BROWN, P. K., and CUMMINS, W. T. A differential study of coccidioidal granuloma and blastomycosis. Arch. Int. Med., xv, No. 4, April 15, 1915.

There are clinical, cultural, pathological, and therapeutic differences. Coccidioidal granuloma is always fatal; blastomycosis rarely so, except where systemic infection is associated with bacteria. Clinically and pathologically, coccidioidal infection is more like tubercle, there being greater predilection for the lymphatic system and more tendency for skin lesions to ulcerate than in blastomycotic diseases. Blastomycotic infection is more common in women than coccidioidal. Iodids benefit or cure blastomycosis while they have no effect upon coccidioidal granuloma.

In the above features, however, confusion is common and the organisms are certainly closely related, but show differences justifying the conclusion that they are distinct. Morphologically, endosporulation in coccidioides infection and budding forms in blastomycosis distinguish them in fresh preparations from tissues. Culturally, except for more rapid growth of coccidioides, there is little difference. Blastomycetes grow best at 20° C., while coccidioides do best at 37° C. Small quantities of dyes in nutrient agar showed differences in the organisms as to inhibition, as did also the inoculations into rabbits and guinea-pigs.—(C. S. B.)

CROWELL, B. C. Notes on the diagnosis of Asiatic cholera at autopsy. Philippine Jour. Sc., ix., Sec. B, No. 4.

No single pathological feature is constant. Acute catarrhal enteritis associated with cyanotic finger nails, dry tissues, oligemia, dry, sticky peritoneum, pink serosa of ileum, empty contracted urinary

bladder, shrunken dry spleen and liver, acute degeneration of parenchymatous organs, poorly coagulated blood, absence of formed feces, presence of rice-water intestinal contents, and prominence of lymphoid tissue in the ileum epitomize the features of an autopsy diagnosis.

In the cases examined at autopsy (92 in all) bacteriological examination was also carried out. The autopsy diagnosis was made without knowledge of the bacteriological, and the two were in agreement in 87 of the 92 post-mortems performed. The author calls attention to the fact that in an epidemic not all those who harbor cholera spirilla in their intestine necessarily have cholera.—(C. S. B.)

WALKER, E. L. The morphology of the adults of the filariæ found in the Philippine Islands. *Philippine Jour. Sc.*, November, 1914.

Ashburn and Craig (1906) described the larval filariæ found in the blood of a native of the Philippine Islands as a new species, *Filaria philippinensis*. The diagnosis of the new species was based on the study of the larvæ from a single case of infection. They distinguished *F. philippinensis* from hitherto described species by certain peculiarities in the morphology and the lack of periodicity of the larvæ.

Phalen and Nichols (1908-9) made somewhat extended observations on the occurrence and distribution of filariasis and elephantiasis in the Philippine Islands. They found a distinct nocturnal periodicity in the appearance of the larval filariæ in the peripheral circulation in all of their cases, and they concluded that the larvæ in all the cases studied by them corresponded to the larvæ of *F. bancrofti*.

Dr. J. W. Smith (1914) found filarial infection in about 6 per cent of the prisoners in Bilibid prison. The larvæ in all cases showed a distinct nocturnal periodicity. One adult male and three adult female filariæ were obtained from a cyst in one of these cases. These are the first adult filariæ available for study in the Philippines and are fully described by Walker in this article. He gives a detailed description of the anatomy of these worms, including measurements, and then compares them with the known species of filariæ.

There are no characters that preclude the identity of the Philippine filaria with *F. bancrofti*. On the other hand, all the essential characters of the Philippine filaria correspond to those of *F. bancrofti*. He therefore concludes that the Philippine filaria appears to be identical with *F. bancrofti*.

The decision based on the study of specimens from one patient does not preclude the possibility of another species of filaria existing

here, but in conjunction with the evidence of recent studies of the larval forms, it renders it extremely improbable and it establishes definitely for the first time the existence of *F. bancrofti* in the Philippine Islands.—(A. B. C.)

CHEMISTRY AND PHARMACY.

E. W. BROWN, Passed Assistant Surgeon, and O. G. RUGG, Chief Pharmacist, United States Navy.

Notes, queries and answers; coloring of bichlorid of mercury solutions. Am. Drug. and Pharm. Rec., lxiii, No. 4, April, 1915.

In response to inquiries relative to practicable means for coloring concentrated solutions of bichlorid of mercury blue, and difficulties encountered in complying with the Navy Department's instructions the following observations are taken from the chemists' replies:

A number of experiments have been made as to the compatibility of anilin dyes with concentrated solutions of bichlorid of mercury and the result is practically this: Blue dyes of the rosanilin group, as methylene blue, are precipitated almost immediately with strong solutions of bichlorid of mercury and sooner or later with dilute solutions, there seeming to be an incompatibility. Citric acid, hydrochloric acid, ammonium chlorid, and other agents were tested, but none prevented the precipitation of a mercuric salt of the methylene blue base. The reagent found most permanent is the anilin color known as magenta, which was not precipitated after two weeks standing with 1 to 20 bichlorid of mercury solution. On dilution of the concentrated solutions with water the dilutions showed a marked reddish pink tint. The blue coloring used for tablets by several manufacturers is soluble Prussian blue, ferrous ferricyanid or ferric ferrocyanid made soluble by addition of a small proportion of oxalic acid. Others use anilin colors, but as the usual solutions are so dilute and are for immediate use the precipitation of the coloring matter is seldom noticed unless the solutions are kept for some time. As many of the blue anilin dyes resemble alkaloids in their chemical constitution it is easily seen why they should be precipitated by strong mercuric chlorid solutions. Soluble Prussian blue seems to be the most permanent coloring agent for strong solutions of this salt. It is possible to dissolve the precipitate from methylene blue with hydrochloric acid, but the excess would make the solution irritating and the color will be of a greenish tint rather than blue.

(Common bluing used in laundries, or navy blue, have given very satisfactory results. L. Z.).—(HOSPITAL STEWARD L. ZEMBSCH, U. S. NAVY.)

MAOHT, D. I. **An experimental study of lavage in acute carbolic-acid poisoning.**
Bull. Johns Hopkins Hosp., April, 1915.

Acute poisoning with phenol or carbolic acid is one of the commonest forms of fatal poisoning met with in this country and in England. It is one of the most quickly fatal poisons, and therefore to save a patient very prompt attention and appropriate first-aid are required. Lavage of the stomach has, for a long time, been recommended in all cases of phenol poisoning, using either plain water or watery solutions of various substances.

Two drugs in particular have been used in this connection—alcohol and sodium sulphate. The internal use of alcohol in carbolic-acid poisoning originated in the fallacious deduction that, because alcohol is an excellent antidote for carbolic-acid burns of the skin, therefore it must be useful in the treatment of carbolic-acid burns of the stomach.

Cats and dogs were used, as these are animals most suitable for the study of lavage. His attention was chiefly directed to the comparative study of the three reagents most used in phenol poisoning—namely, plain water and aqueous solutions of alcohol and of sodium sulphate. He first determined the smallest dose of the drug required to kill the animal in a short time. Then, after giving a fatal dose of phenol, he attempted to save the animal by lavage performed at varying intervals after the administration of the drug.

Of the three reagents used, sodium sulphate was found to be the most efficient, next in order being plain water. Alcohol was found to be distinctly deleterious and often appeared to hasten a fatal issue.

The chances of saving an animal depend, firstly, on the dose of poison swallowed or introduced into the stomach; secondly, on the promptness with which lavage is begun; and, thirdly, on the solution used in washing the stomach. The earlier the lavage is begun the greater the chances of recovery, even though a large quantity of poison has been taken. The presence of food in the stomach greatly increases the chances of recovery.

The action of sodium sulphate is, probably, not a chemical one, but must be due to the hindering of absorption, and, possibly, also to purgation of the animal.

In the study of alcohol in this connection a great difference was found, depending on whether the alcohol was given before or after the phenol. When an animal was given alcohol to the point of intoxication it seemed to have an increased resistance to the subsequent administration of phenol. The explanation of this phenomenon is not quite clear, but the result is probably due to the greater affinity of the alcohol for the nerve cells, which prevents the phenol from getting hold of them.

The effect of alcohol after the ingestion of phenol is simply to promote still further absorption of the acid, as it acts as an excellent solvent for phenol.

These experiments furnish an explanation for the conflicting opinions in respect to the value of alcohol in carbolic-acid poisoning. A previously drunken person will probably withstand the ravages of phenol better, whereas one who takes carbolic acid mixed in alcohol, or victims of phenol poisoning washed or doused with alcohol for therapeutic purposes, are more liable to perish.

The results are summarized as follows:

1. The efficiency of lavage in phenol poisoning depends on the quantity of poison taken, on the time after poisoning that the lavage is begun, and on the solution used for washing the stomach.

2. A strong solution of sodium sulphate appears to be the most useful for this purpose; next in efficiency comes plain water.

3. The influence of alcohol in phenol poisoning depends on the time of its administration. An animal that is previously intoxicated with alcohol can withstand better the effects of phenol taken afterward. On the other hand, alcohol administered to an animal after poisoning with phenol will aggravate the symptoms and hasten death.

4. The use of alcohol in phenol poisoning should, therefore, be strongly discouraged.—(A. B. CLIFFORD.)

SCHAEFER, H. H. **Notes on a new alkaloid found in nux vomica.** Merck's Report, April, 1915.

The author reviews the literature on the alkaloids heretofore claimed for nux vomica, among which is igasurin, described by Desnoir (*Jahresbericht* 50–54, p. 48), as well as a glucoside, loganin, reported by Dunston (*Pharm. Jour.*, 111, xiv, 1025). The conflicting nature of the various published findings thus reviewed led to the investigations reported in the above paper. It is claimed that there is a question of the existence of such an alkaloid as igasurin, and that searching investigation has revealed the presence of a distinct alkaloid, for which the name struxin is proposed. It is stated that this substance is not found in all nux vomica beans, being confined to those from Cochin-China, and in these shipments generally in small, insect-eaten beans, and such as have been partly decomposed by prolonged exposure in wet fields. The empiric formula and the molecular weight closely resemble those of brucin and strychnin, and the author believes that these similarities and the physical peculiarities of the beans in which this substance is found indicate that it is a product of decomposition either by fermentation or oxidation of

either one or the other of the two well-known alkaloids. Salts have been made, and these are fully described, as well as characteristic reactions of the alkaloid. Physiological findings are to be published later.—(P. J. WALDNER.)

PITTINGER, P. S., and VANDERKLEED, C. E. Preliminary note on a new pharmacodynamic assay method. *Jour. Am. Pharm. Assn.*, April, 1915.

An altogether radical departure from the conventional methods of physiological standardization is described. The authors used goldfish as test animals, placing them in varying dilutions of the drug and noting the minimum dilution which will cause death in a given time. Digitalis was employed in all the experiments.

The following conclusions, quoted from the paper, sum up concisely the deductions to be made from the numerous tabulations covering the work so far done by the authors:

1. Goldfish are sensitive to variations of $2\frac{1}{2}$ per cent in the strength of the dilutions of digitalis in which they are placed.
2. Variations due to differences in the rate of absorption appear to be practically eliminated by the use of these animals.
3. Decreasing the strength of the dilution increases the sensitiveness of the test.
4. The weight of the fish may be disregarded when making tests by this method.
5. Variations in the temperature markedly influence the resistance of goldfish to digitalis poisoning.
6. The individual variation in the susceptibility of goldfish is much less than that found in guinea-pigs and frogs.
7. The goldfish method is unquestionably the simplest so far proposed and can easily be carried out by those not especially skilled in the pharmacodynamic art.
8. The inexpensiveness of the assay is decidedly in its favor. Goldfish of the proper size can be purchased wholesale for from 45 to 60 cents per dozen.
9. A sufficient number of animals can be procured at all seasons of the year.—(P. J. WALDNER.)

DESGREZ, A., and MOORE, R. Estimation of urea. *Compt. rend. Acad. d. sc.*, 1914, 159, 250-253.

The decomposition of urea by Millon's reagent is greatly accelerated by the presence of infusorial earth as a catalytic agent, and is then quantitative at 17° C. The reagent is prepared by dissolving 50 grams of mercury in 100 grams of cold nitric acid and adding to the solution an equal volume of the turbid liquid obtained by shaking 1 gram of infusorial earth with 100 c. c. of water, allowing the mixture to stand for 1 minute and decanting the supernatant liquid. A special ureometer, the lower part of which is curved upward and ends in a bulb, is used for the estimation. The graduated body of the instrument is filled with chloroform by means of a capil-

lary funnel passed through the stopper at the top. The urea solution, washing water, and reagent are then successively introduced and the ureometer immersed in water at about 25° C. In the case of urine 1 c. c. is used with about 2 c. c. of water and 6 c. c. of the reagent. The last traces of the carbon dioxide in the liberated gas are removed by introducing 2 c. c. of potassium hydroxid solution. The residual gas is measured in the usual way. The estimation is finished in 40 minutes, while 17° C. an hour is required. The only other nitrogenous constituent in urine decomposed by the reagent under these conditions is allantoin, but the amount of this excreted in human urine is very small—about 0.015 gram in 24 hours.—(E. W. B.)

PLIMMER, R. H. A., and SKELTON, R. F. Estimation of urea and indirectly of allantoin in urine by means of urease.¹ *Biochem. Jour.*, 1914, No. 8, 70-74.

The estimation of urea in urine is quickly and accurately made by decomposing it with urease (1 gram powdered soya bean) at 35° to 40° C. for 1 hour. By fitting together three or four cylinders and Allihn bottles in series with a sulphuric-acid bottle at the end, duplicate estimations of ammonia and urea in urine can be carried out simultaneously. In the cylinders for the urea estimations are placed 50 to 60 c. c. of water, 1 gram of finely ground soya bean, and 5 or 10 c. c. of urine. These cylinders are kept in a water bath at a temperature of 35° to 40° C., an air current being drawn through the series. After about an hour the cylinders and bottles are disconnected and 1 gram of anhydrous sodium carbonate is dropped into the cylinders. They are then connected together again and the air current drawn through for another hour. To prevent frothing, liquid paraffin (B. P.) is used. It is superior to petroleum or toluene, as it does not evaporate, and it obviates the necessity of using a tube containing cotton wool between the cylinder and the Allihn bottle. It is unnecessary to carry out a control experiment with soya bean alone, since no ammonia was evolved by two different samples of the bean which were tested several times. The Allihn bottles are charged with excess of N/10 alkali, using alizarin red as indicator. The method was tested on solutions containing different amounts of pure urea, and the results were found to agree with a nitrogen determination by Kjeldahl's method. Urease does not decompose allantoin; and since both allantoin and urea are quantitatively decomposed by the magnesium-chlorid method of Folin, the amount of allantoin in those urines which contain both compounds is readily estimated by difference.—(E. W. B.)

¹ Urease is an enzyme in soya bean which converts urea into ammonia.

MARSHALL, E. K., Jr., and DAVIS, D. M. Urea; its distribution in and elimination from the body. Jour. Biol. Chem., xviii, (1914). No. 1, pp. 53-80.

The results are reported of a large number of experiments from which the following are among the conclusions drawn:

Urea is present in all organisms and tissues of normal animals.

The urea content of all organs and tissues is approximately uniform and approximately equal to that of the blood, both in normal conditions and when there is an abnormally large amount of urea present. Exceptions to this rule are fat, which has a low content, and the urinary tract, which has a high content.

When urea in solution is injected intravenously it diffuses to all parts of the body almost instantly, the diffusion being complete in a few minutes.

Urea is eliminated very rapidly by the kidneys; the rate of excretion may rise to 16 grams per kilogram of body weight per day or much higher.

When excretion of urea is prevented the entire amount formed is stored in the body, except small amounts secreted in the bile, sweat, etc., and there is no evidence of the conversion of urea into other substances.—(E. W. B.)

THOMAS, J. B., and SANDMAN, E. A. Results of the hypochlorite disinfection of water supplies. A comparison of the reduction of the different members of the *Bacillus coli* group. Jour. Ind. and Eng. Chem., 1914. No. 6, 637-639.

The two supplies were treated with hypochlorite at the impounding reservoirs, then passed through pipes about a mile in length to the storage reservoirs, where the water was kept from five to seven days before entering the distribution system. The amounts of available chlorine applied varied from 0.65 to 2 parts per million. Lactose bile was used as an initial medium, and Endo's agar for isolating the *B. coli* organisms in pure culture. These organisms were divided into four subgroups by the use of dulcitol in addition to the commonly used sugars and gelatin. For the purpose of classification those organisms causing gas production in lactose, dulcitol, sucrose, and dextrose were considered to be *B. coli communior*; those causing gas production in lactose, dulcitol, and dextrose, without liquefaction of gelatin, were classed as *B. coli communis*; those causing gas production of the three sugars, but not in dulcitol, with or without liquefaction of gelatin, as *B. lactis aerogenes*; and those causing gas production in lactose and dextrose only were called *B. acidi lactici*. This, however, was but a general classification. The number of organisms growing on standard agar medium was also determined. The treatment caused a reduction of from 97 to 99 per cent of these four subclasses of organisms, and all appear to be equally vulnerable to the action of chlorine. A greater reduction (83 to 99 per cent) was observed in the organisms growing on agar at 20° C. than in those growing at 37° C. (76 to 85 per cent). When the amount of available

chlorin added exceeded 1.5 per million, the water delivered to the city had an odor of chlorin, and the presence of free chlorids could be detected chemically; the addition of smaller quantities led to fewer complaints from consumers, although trouble was still encountered when the water was used for the manufacture of ice. The odor of chlorin was most noticeable in the core ice, where it became segregated as the water froze; distillation of the water before freezing did not eliminate the odor.—(E. W. B.)

PERLZWEIG, W. A., and DAVIES, W. J. **A further study of the chemical composition and nutritive value of fish subjected to prolonged periods of cold storage.** *Biochem. Bull.*, III (1913), No. 9, pp. 67-71.

Continuing the work of a previous paper, samples of fish stored up to two years were examined. The gastric and intestinal membranes of the fish were found to be intact. The abdominal viscera in general were sound and had no odor when handled, other than would be noted with fresh flounders.

The constancy in the data for the yield of ammonium nitrogen, for the reaction of the aqueous extracts, and for acidity of the lipins, shows conclusively that there was no appreciable alteration of the flesh of the fish through bacterial influences. The uniformity in the data for "soluble" and for "noncoagulable" nitrogen (making due allowance for the gradual loss of water from most of the fish as the storage period lengthened) shows that there were no appreciable autolytic changes.

Some of the fish that had been subjected to analysis, including three in storage for two years, were served with meals in conventional ways to a number of people, the authors among them. These portions were palatable and entirely acceptable. The taste was slightly different, perhaps somewhat more "fishy," though not unpleasantly so; but otherwise there was nothing to suggest a lack of freshness.

We do not suggest that our findings would apply in any degree to fish that were not strictly fresh and unspoiled before they were put in cold storage. It is obvious, also, that these results have no bearing on the condition of fish which have been removed from cold storage and kept a week or more in a shop, exposed, until sold, to public inspection during market hours, and iced or kept in a common refrigerator at night. It is equally obvious that these data have no material bearing on the cold storage of anything except fish.

The results of our studies convince us that fresh fish, similar in general character to flounders, may be preserved frozen, by the best cold-storage processes, for at least two years without undergoing any important chemical alteration, and without materially depreciating in nutritive value.—(E. W. B.)

EYE, EAR, NOSE, AND THROAT.

H. J. GROW, Surgeon, and G. B. TRIBLE, Passed Assistant Surgeon, United States Navy.

KARDO. **Treatment of trachoma with carbonic-acid snow.** *Ztschr. f. Augenhellkunde*, April-May, p. 450.

Kardo has tried this remedy in 92 cases, mostly in the second stage, with good results. The other eye was treated otherwise for

comparison. The snow produced a rapid absorption of the follicles, but its effect is confined to the place where it is applied.

Subconjunctival injections produce hyperemia of the ciliary body and the aqueous secretion becomes richer in albuminates and antibodies. Sattler (Action of anesthetics in subconjunctival injections) has studied, by experiments on rabbits, the question whether or not the addition of anesthetics diminishes the effect of the salt injection. The results of a large series of experiments go to show that the effect on the ciliary body is considerably diminished by cocainizing the conjunctiva or by the addition of cocain to the fluid injected. The reason is not the contraction of the vessels caused by the cocain but the paralysis of the sensitive nerves, which interrupts or diminishes the reflex action. Different drugs interfere to varying degrees with the effect of the salt solution. The effect is diminished most by cocain, less by novocain or alypin, not at all by acoin.—(E. J. G.)

LEBER. A. Samoan conjunctivitis. Arch. f. Ophth., lxxxvii, p. 528.

Leber has studied in Samoa an endemic form of conjunctivitis, called Samoan, which is due to the *Diplococcus samoensis*. It begins as a very acute conjunctivitis, sometimes resembling gonorrheal. The preauricular gland is swollen; rhinitis and pharyngitis are present. There is edema of the upper lid, small hemorrhages appear on the bulbar conjunctiva, and the conjunctivae of the lids and fornix are swollen. The discharge is at first thin, but soon becomes purulent. Sometimes the periphery of the cornea becomes hazy. All of these symptoms disappear under appropriate treatment in 9 or 10 days, and complete recovery is the rule. Absence of treatment or wrong treatment, however, may lead to perforating ulceration of the cornea and even to phthisis bulbi.—(E. J. G.)

MEYERHOF. M. Is there a natural or acquired immunity to trachoma? Rev. gén. d'opht., xxxiii, p. 145.

Meyerhof concludes that there is neither racial nor individual immunity to trachoma. One attack of the disease is no guard against another. Serum treatment, therefore, seems to be hopeless. In some cases there is an interval of several years between the affection of the first and that of the second eye. Among 2,828 private patients he found only 7 in which the disease was confined to one eye.—(E. J. G.)

NONNE and WOHLWILL. Clinical and anatomical study of a case of isolated reflex immobility of the pupil, paralysis, tabes, and cerebrospinal syphilis being excluded. Neurol. Centralb., 1914, p. 611.

Nonne and Wohlwill's case was a rare one of reflex immobility of the pupil without any other indications of tabes, general paresis, or

cerebrospinal syphilis to be found. Autopsy revealed pulmonary tuberculosis, degeneration of the cardiac muscle, or syphilitic aortitis. The brain and spinal cord were perfectly normal. Hence it seemed to be a trace of a former syphilitic affection that had apparently been cured, especially as the examination of the liquor was negative. Such a case is rare and is a warning to care in the diagnosis of tabo-paralysis.—(E. J. G.)

SIEBEMANN. Protection against injury of the hearing. Cor.-Bl. f. schweiz. Aerzte.

It has been demonstrated that the same pathological changes can be produced in animals, which are the consequence of prolonged exposure to loud noises, such as boiler making. The lower part of the organ of Corti suffers first, but in time there is a partial degeneration of the nerve.

Siebemann's experiments demonstrated that the internal ear suffered only when the middle ear was sound and able to transmit impulses. If the middle ear of one side was blocked, the labyrinth was not damaged, while on the other, unblocked side there was degeneration of the epithelium of the cochlea. This confirms the assumption that the sound waves do no damage unless they enter through the foramen ovale.

Animals whose ears were plugged with oil-soaked cotton did not suffer from long-continued exposure to recurring loud noises. However, no preventive or attenuating influence was apparent from the use of thick felt under foot to deaden sound. The transmission of sound by other routes than the middle ear ossicles has slight, if any, injurious action on the organ of hearing.—(G. B. T.)

REED, W. R. Chronic local infection of the nose, throat, and ear as a cause of general infection. Jour. Missouri Med. Assn., xii, No. 5.

Infections producing the greatest number of diseases enter the system by way of the respiratory and alimentary tracts, hence the great importance of the well-known diseases of the nasal passages and their sinuses, and the large tonsils and adenoids with their cryptogenic infections. As sequels of these focal infections are acute rheumatism, acute nephritis, acute endocarditis, pneumonia, appendicitis, tuberculosis, cholecystitis, and meningitis. In the author's opinion the faucial tonsils are the most frequent sources of infection.—(G. B. T.)

SLUDER, G. The sympathetic syndrome (undescribed) of sphenopalatine or nasal ganglion neurosis; together with a consideration of previously described symptoms and treatment. *Lancet-Clinic*, cxii, No. 17.

In 1908 Sluder described a symptom-complex proceeding from disturbance in or about the sphenopalatine or nasal ganglion. He advanced the view that the pterygomaxillary fossa in which the ganglion lies is tantamount to a para-nasal air cell, and believed that the entire syndrome was produced by attacks on the nerve trunks which supply the ganglion (maxillary division of the trigeminus and the vidian), in their passage through the body of the sphenoid.

Usual syndrome.—A history of a coryza, later pain at the root of the nose and about the eye, the upper jaw and teeth extending backward to the ear, over the mastoid, but severest at a point 5 cm. from that, and may extend to the shoulder and down the arm. The sense of taste on the affected side is disturbed. These symptoms may run a cyclical course.

Treatment.—In recent cases cocainization of the ganglion is curative. Applications of 2 per cent silver nitrate or 1 per cent formalin to the sphenopalatine foramen membrane will cure subacute cases. Chronic, severe cases require injection. He makes the injection by means of a straight needle inserted under the posterior tip of the middle turbinate to a depth of 0.5 cm., or a curved one through the sphenopalatine foramen. The injection may need repeating later.

The sympathetic syndrome.—Inflammation has preceded the vasomotor and secretory symptoms. There may be severe and protracted sneezing, nasal congestion, and a profuse thin hot secretion. With this there is congestion and redness of the external nose, and later roughening of the skin. There is conjunctivitis accompanied by dilatation of the pupil. Photophobia and inability to do work requiring near vision may exist.

The author found from experience that these cases yielded to the same treatment as those of the inflammatory type.—(G. B. T.)

Shell explosions and the special senses. *Lancet*, London, i, No. 13.

Several groups of cases may be distinguished: Firstly, inhibition of function from prolonged overstimulation; boiler makers, blacksmiths, and others subjected to prolonged monotonous noise become deaf to certain sounds. Severe overstimulation may lead to permanent pathological changes. A disturbance of function may result from shock or commotio, which may be a part of a general commotio cerebialis, or a labyrinthine commotio.

The damage to the labyrinth may be slight or there may be marked changes, hemorrhage, etc. Fracture of the skull may coexist and rupture of the membrana tympani may also be present. There may

be loss of consciousness followed by vertigo, tinnitus, and deafness. Deafness and tinnitus persist after the vertigo disappears. The deafness may be unilateral or bilateral, bone conduction is diminished, and the upper limit of audibility of high notes is lowered.

Reviewer's note.—This description applies to conditions frequently seen following target practice and the impairment of hearing seen in the service in general, particularly to the deafness to “metallic” sounds, such as watch tick, acoumeter, which may be heard at comparatively little distance as compared to whisper or voice tests.—
(G. B. T.)

REPORTS.

A REVIEW OF THE TREATMENT AND RESULTS AT THE U. S. NAVAL SANATORIUM FOR TUBERCULOSIS AT LAS ANIMAS, COLO.¹

By G. H. BARBER, Medical Inspector, United States Navy.

The Tables A and B, appended to this report, show, respectively, the number of all classes of patients and their disposition during the calendar year of 1914, and enable a comparison to be made of the work done during 1911, 1912, 1913, and 1914.

The total number of all cases treated during the year was 452, of which 208 remained from last year, 244 were admitted, 221 discharged, 231 were continued to 1915. Of the admissions, 5.6 per cent had concurrent syphilis. It is not possible to compare this item with similar admissions for 1913, which were stated to be 10.3 per cent. This constituted the percentage of cases in the hospital, no attempt having been made to estimate the percentage of admissions separately.

The number of deaths during the year, 44, was twice as great as for 1913. The average number of sick days for each death for 1913 was 236.8; for 1914, 191.1. During 1914 the admission of far-advanced cases was 46, which was 19 more than for 1913. A considerable number of these cases lived only from a few days to less than a month after admission. A few of these cases were received from active service, but the majority were supernumerary cases who were homeless and their pension was not sufficient to provide for their support. It is believed that this class of patients will increase as time goes on rather than decrease. These patients upon discharge are advised and encouraged to settle somewhere in the Mountain States, as many of them will be able to live comfortably for a considerable number of years in this general locality who would not live six months in a humid, sea-level climate.

The table appended and marked A is made up in accordance with the old classification of the National Association for Study and Prevention of Tuberculosis. The new classification, adopted in 1913, was not received in time to be used for this year's report. Owing to the frequent changes in the personnel and the lack of experience and training of some individuals the admission classification is not strictly in accordance with the society's requirements, and in a meas-

¹ From Annual Sanitary Report, Jan. 1, 1915.

ure misrepresents the actual work accomplished here, and to that extent is not comparable with similar reports from any of the leading sanatoriums throughout the country. A considerable number of the cases tabulated as moderately advanced should have been in the incipient column, a few of the cases should have appeared among the "far-advanced" cases. An attempt will be made to correct this error during 1915.

During the past year the treatment of cases has been confined to a continuation of Patterson's graded rest and labor as a routine measure for all cases except the far advanced, and with the same gratifying results noted in previous reports.

Heliotherapy.—Excellent results were obtained in all surgical cases subjected to this treatment during the year. A report on all cases has already been submitted and published in the Bulletin for January, 1915, by Passed Asst. Surg. Holeman. It is possible to employ this method here during about nine months of the year. One case contained in that report has voluntarily remained in his tent all winter. It will be necessary to put up some sort of a shelter to protect these patients and their tents from the occasional strong winds, and so do away with the necessity of moving them into the wards from time to time.

The Minin current—ultra-violet rays.—This therapeutic method has been in use about three months. It was brought to my attention by several physicians practicing in this vicinity. The class of cases suitable for this treatment includes all sinuses tubercular in origin, whether resulting from operation or otherwise; superficial tubercular glands and tubercular abscesses. We have had about 20 cases thus far, and all have responded in a most satisfactory manner. Sinuses that had formerly taken from three to four months to heal closed in as many weeks, and a number of cervical glands have about entirely disappeared. We had one remarkable case of lung abscess with two sinuses. This abscess was discharging profusely, requiring several dressings daily; patient was septic and had been reported in a most serious condition. In one week the discharge was reduced almost to the vanishing point, temperature was reduced 2° or 3°, and the patient is now sitting up several hours daily, with a good appetite. The necessary apparatus is simple and inexpensive.

As noted in the annual report for 1913, we have set up the apparatus necessary to give a trial to a method of treatment by inhalations, devised and used for the past 15 years by Dr. William A. Shepard, of Colorado Springs, Colo. This practitioner believes that practically all cases of tuberculosis as they present themselves for treatment (six months to one year from the time of the onset of the disease) will be found with a decided deficiency in the normal oxygen content of the blood, and that this absence of the normal oxygen

content has had an appreciable influence on the onset of the tuberculous infection itself, as well as the more or less rapid progress of the disease in the various classes of cases observed. Observations bearing upon this belief have been made in the past by numerous medical men, and many contradictory statements are recorded. It has been determined to repeat these observations here, and make a clinical analysis of the blood of each patient during the year, making the first examination on admission and repeating the same as often as may be found useful in noting the improvement in the blood condition which may be brought about by the treatment and climatic conditions. About 30 cases have been examined to date. In not a single case has there been found a normal oxygen content, and but two cases have shown a normal content after two months' residence here. Both have the disease in the incipient stage and were in good general physical condition when they arrived. A considerable number of these cases give a hemoglobin reading by Dare's instrument of 45 to 60 per cent and from 2,000,000 to 3,000,000 red cells below normal.

It was a firm belief in the existence and bearing of the above conditions which led to the administration of oxygen freely in all cases where it was indicated as a part of the treatment. Ozone is produced by means of a combination, direct and alternating current motor, in large quantities, and the oxygen obtained from this by passing the gas through a number of purifying bottles. At the same time this gas is more or less completely saturated with oil of pine-needles, terebene, and creosote, and administered three times daily for a period of 3 to 10 minutes. The apparatus we have set up enables 32 patients to take the inhalations at one time.

The second feature of the treatment consists in the deep inhalation of an inhalant composed of creosote and iodine—30 per cent creosote and 13.5 per cent iodine. The inhalations are made most efficient, the inhalant being forced into every part of the lung where it is possible for air to enter, by attaching the bottles to an ordinary spirometer. Of course there is nothing new in this form of medication, except possibly the preparation and dosage of the iodine. M. Le Boudreau, in the *Journal de Médecine de Bordeaux*, January 4, 1914, emphatically advocates a systematic trial of iodine pushed to the extreme limit of tolerance, on the strength of his own clinical experience with it for 10 years in the treatment of pulmonary as well as other forms of tuberculosis. This report contained the results obtained by him and was published for the first time at the end of the period mentioned. He gave the drug by mouth in the form of the tincture of iodine, French codex, 1908. In the case of adults, 250 to 400 drops were administered daily over periods of many months without causing any constitutional disturbances whatever. Curle, of Glasgow,

and Reeve, of London, during 1912 worked along the same lines by means of intensive nascent iodine and obtained the same results, but the form of administration was often very objectionable and many patients refused to take the drug on that account. We have combined the methods and, in suitable cases, administered the iodine by mouth, in addition to the inhalations, up to the individual tolerance of the patient. Such, in brief, is the method of treatment advocated by Dr. Shepard during the past 15 years, and the principal reason why it is being given a trial here. It is claimed that if it is carried out in a conscientious manner for a period of at least six months a cure of at least 90 per cent first-stage cases and 40 per cent of second-stage cases may be expected, and that a great majority of his cases have returned to their homes, at practically sea level, without relapse. Many, if not all third-stage cases will be greatly benefited, especially from the use of the oxygen inhalations, and thus tend to ameliorate the conditions in this unfortunate class of patients.

For reasons noted above in commenting on our statistical report it would be unfair to attempt to give our results in the form of a table or tables. Further, the class of patients under treatment here renders the task of administering a treatment of this nature difficult, and in some cases impossible to carry out successfully. Incredible as it may appear, there are now a considerable number of young, irresponsible individuals who do not want to become entirely well, and conduct themselves accordingly. The prospects of their being taken out of the pensionable class do not appear desirable to them. The close watching of such a class of patients which would be necessary to insure the effective use of any form of inhalations is beyond the present facilities of this institution. They are apt to be confined to the class of cases that would expect to receive the greatest benefit from such treatment. This state of mind removes them entirely from the class of pay patients in a civilian institution where, if conscientious personal endeavor constituted an asset in the prospect of a favorable outcome in the treatment of their disease, they could be counted upon to exert themselves to the utmost.

During the coming year an effort will be made to eliminate conditions which tend to misrepresent the facts in our statistical report and prevent useful comparison between the work done here and in similar institutions in civil life.

During the past seven months 53 cases have been under fairly close observation while taking the inhalation treatment. Of this number, 34 were first-stage cases, 11 second-stage, and 8 third-stage. Of the 34 first-stage cases, 80 per cent have been or will be discharged in the near future with the disease arrested. Of this number, 15 were admitted with negative sputum and have remained so; 15 became negative and have remained so from two to five months. Practically

all the second-stage and third-stage cases have been improved to a greater or less degree, and some of the second-stage cases arrested. The improvement consists in great diminution of cough and expectoration, a normal temperature, and a marked reduction in attacks of pleurisy and hemorrhages.

Of our 231 patients at present under treatment, 42 are in the infirmary. Of this number, 12 are recent admissions and are in bed in the north wing, where they remain two weeks after admission, regardless of the stage of the disease, which leaves 30 cases of second and third-stage patients whose condition necessitates infirmary treatment. The balance are in the convalescent wards, temperature free, and are in one of the six working grades. Our experience of the past seven months indicates a decided confirmation of the results reported by Boudreau, Curle, and Reeve, quoted above.

TABLE A.—Statistical summary of treatment and results at the United States Naval Sanatorium for Tuberculosis at Las Animas, Colo., for the year 1914.

	Classification.			Total by divisions.
	Incipi- ents.	Moder- ately ad- vanced.	Far ad- vanced.	
Remaining from last year.....	67	117	24	208
Readmitted from other places.....	65	131	46	242
Original admissions from Las Animas.....	1	1	—	2
Discharged during the year.....	67	100	54	221
Continued to next year.....	66	149	16	231

Discharged from the institution as—	Num- ber.	Days.	Num- ber.	Days.	Num- ber.	Days.	Num- ber.	Days.
Dead.....			12	3,823	31	4,395	43	8,218
Unimproved.....	12	2,823	38	10,780	12	3,184	62	16,787
Improved.....	29	8,958	30	9,044	10	3,526	69	21,528
Arrested.....	16	3,468	10	1,785	—	—	26	5,253
Apparently cured.....	8	2,056	9	3,475	1	733	18	6,264
Diagnosis changed to nontubercular disease.....	2	70	1	250	—	—	3	320
Continued to next year.....	66	24,016	149	40,708	16	5,852	231	70,576
Total for above.....	133	41,391	249	69,865	70	17,690	452	128,946

Number cases of acute miliary tuberculosis during the year, 3.

Total sick days of cases continued to 1915, 70,576.

Total sick days of cases discharged during 1914, 58,370.

TABLE B.—A review of the treatment and results during the years 1911, 1912, 1913, and 1914.

1911, 215 admissions:

213 discharges, with a total number of sick days..... 52,100
 146 cases continued to next year, with total sick days of..... 41,574

Total sick days..... 93,674

Average number of sick days for each case discharged, 244.60.

Average number of sick days for each case retained, 284.75.

33 deaths, with average number of sick days for each case, 246.06.

1912, 182 admissions:

190 discharges, with a total number of sick days-----	47,994
142 cases continued to next year, with total sick days of-----	44,138

Total sick days----- 92,132

Average number of sick days for each case discharged, 252.6.

Average number of sick days for each case retained, 310.83.

26 deaths, with average number of sick days for each case, 194.03.

1913, 225 admissions:

159 discharges with a total number of sick days----- 49,623

208 cases continued to next year, with total sick days of----- 53,533

Total sick days----- 103,156

Average number of sick days for each case discharged, 312.

Average number of sick days for each case retained, 235.73.

22 deaths, with average number of sick days for each case, 236.81.

1914, 244 admissions:

221 discharges, with a total number of sick days----- 58,370

231 cases continued to next year, with total sick days of----- 70,576

Total sick days----- 128,946

Average number of sick days for each case discharged, 264.11.

Average number of sick days for each case retained, 305.52.

43 deaths, with average number of sick days for each case, 191.11.

During 1911 and 1912 the number of patients remained very nearly constant, admissions and discharges keeping equal pace. At the end of these two years 146 and 142 cases, respectively, remained. At the end of 1913, 208 cases remained, admissions making a decided gain over discharges. At the end of 1914, 231 cases are reported as remaining, making a further gain, admissions being in slight excess over discharges. Some of these patients are on sick leave, but still connected with the hospital.

During 1914, 25,790 more sick days were carried than during 1913, 36,814 more days than during 1912, and 35,272 more days than during 1911.

BATTLESHIP VENTILATION. PERMANENT DETAIL OF STRETCHERMEN.¹

By J. S. TAYLOR, Surgeon, United States Navy.

Only those who habitually live and work between decks, particularly those on or below the berth deck, can fully appreciate how promptly the stupefying, depressing effects of unrenewed and motionless air are produced. The fleet regulations enjoin upon the officer of the deck close attention to the matter of ventilation, the opening of the ports and hatches and the rigging of windsails. Unfortunately, when the ship is underway his duties place him where he is least affected by defects of ventilation and unless the higher authori-

¹ From Annual Sanitary Report, U. S. S. *Rhode Island*, Jan. 1, 1915.

ties have the subject constantly in mind it is neglected. There is less and less disposition in the Navy to use windsails and the rule requiring all ports to be closed when underway is adhered to with a firmness which might better be directed to securing fresh air at every opportunity. The sudden increase of "colds," grippe, sore throat, and bronchitis, which invariably marks the return of the fleet to northern waters, is in part due to temperature, but much more to the accompanying closure of ports and hatches, which, of course, favors their rapid dissemination. In this connection it is recommended that whenever drills like fire quarters, etc., call for shutting off the blowers, this be done for only a moment or two, simply to indicate it as a feature of the drill, and that the airless period be never made coextensive with the drill itself. * * *

I believe that under proper restrictions adapted to the time and place and based on military requirements rather than appearances, officers of all grades should be encouraged to read and study under the quarter-deck awning instead of in their rooms; and if it were clearly understood that the measure was a sanitary one and not to enlarge the social features of the ship, that officers, when not on watch, could be allowed to bring camp stools on deck, with the proviso that the privilege would be withdrawn from any individual whose deportment was incompatible with the sanctity of the place, and that the chairs left to cumber the deck would be confiscated, etc.

The fleet regulations call for 10 minutes for physical exercise after quarters. I recommend that this period be extended to 15 minutes, which is little enough, given the conditions under which the bulk of the men work in the modern battleship, and when it is recalled that with the passing of going aloft and the reduced boat work of to-day the men's duties do not induce the deepened breathing and increased heart action in the open air so necessary to vigor and well being.

Sweeping of decks in living spaces should be reduced to a minimum, and no rugs or carpets should ever be swept in wardroom or other officers' quarters. The use of vacuum cleaning for ships has been frequently recommended both by medical and line officers, and the suggestion is repeated here. Each year sees the devices for this operation perfected and growing cheaper, and the attention of the department is again invited to this rapid and efficient method of cleaning up, where through and through currents of air are not available, without the injurious and disagreeable dissemination of dust contaminated by human emanations.

There is on this ship, as on most ships, the usual shortage of relief dressers and stretcher bearers. I believe medical officers have ceased to ask for the large assignment of helpers for first-aid which used to be deemed necessary, and quite properly, from a different concep-

tion of the possibilities of achievement during battle. The problem of efficient service during a lull or after an engagement remains. Two doctors and half a dozen hospital corpsmen will be swamped by the demands made upon them, and the utmost willingness to help will not replace training at such a time. Commanding and other officers who have the duty of regulating these details should realize that proper handling and dressing of one single serious case may easily absorb the efforts of three or four members of the medical department at one time, so that with two well-equipped dressing stations only two or, at most, three dressings could be applied at a time. There is a need, then, for a sort of reserve nursing force, and this could be obtained by having men of a certain rating on all ships uniformly detailed for duty with the medical department at general quarters, etc. In this way a man's transfer to another ship would not mean loss to the dressing station. He would be replaced by a man of the same rating, and he himself would continue his function in his new place of duty. On the U. S. S. *Nebraska* all members of the band are assigned to the medical department in battle and receive such systematic continuous instruction as will make them next in value to the regular nursing force and of real and positive use. If this were done on all ships, we would soon have in the Navy a class of trained assistants to supplement the Hospital Corps so inadequate in numbers for battle requirements.

Naturally the band will be surrendered with regret by the officers to whose station they are detailed now. Some system of this kind must be adopted, however, if medical preparations for battle are to be anything more than a form. The present practice is to assign a mess cook, a coal passer, or somebody from the commissary department who, from the nature of his duties or watches, would be only occasionally available at the ammunition hoists, etc. He therefore receives little or no regular consecutive training from the doctor, and a shift of duty or transfer leads to the substitution of a new man, oftener still leaves a vacancy unfilled for months. On his new ship this man may not be assigned to the doctor, and his slight brief instruction represents so much time and effort lost. As things are now, every medical officer is under the necessity of pleading for men as if asking a personal favor, and those he gets must be instructed only in the simplest and most general way. Any prolonged training, beginning at the beginning and carried through to a positive result of attainment, is idle, as the man will be lost to him sooner or later. But in the day of battle, for which we are preparing, there will be a call for dressers of wounds, and many will die while waiting their turn to be attended to. The duties of the band are such that it would be perfectly feasible to have one or more bandsmen detailed at frequent

periods to engage in the practical work of bandaging and doing dressings in the sick bay. The band could also go in landing parties as part of the medical force or at need be available for work with it in case they went in their regular capacity. In this matter of detail of assistants to the medical department uniformity and permanence is a crying need, and I believe it would be hard to find a scheme which would work so automatically and satisfactorily. In any case, it is like leaning on a broken reed to assign to the medical department at quarters the men who are undesirable for everything else, to make constant changes in the detail, and, then, when the storm of battle breaks, to expect medical service adequate to the situation.

GENITO-URINARY DISEASES AT CHELSEA.¹

By G. B. WILSON, Medical Director, United States Navy.

During the year 1914, 97 cases of syphilis were admitted to this hospital, which is 12 less than the previous year. The diagnosis is invariably confirmed by the Wassermann reaction, and this test is repeated during the course of treatment, in order to follow closely the progress made. In every case diagnosed as syphilis clinically, the Wassermann reaction has been positive, except where the blood has been obtained during the first few weeks of the disease. It has not been possible to obtain a positive Wassermann reaction from patients whose blood has once become negative, in so far as opportunity has afforded for reexamination. Patients are invariably discharged with a recommendation to the medical officer of his ship to continue the mercurial treatment and to have a blood test made at intervals. The patient is urged to continue the treatment, and he is informed that the development of serious nervous affections in later life is possible, and that the finding of a negative test is no assurance that he is cured. Seventy-six out of the ninety-seven men were returned to duty with a negative blood test, and no men were discharged with a positive reaction or discoverable lesions, nor were any men invalidated from the service, and none died from syphilis.

Our routine treatment consists of the administration of the succinimid of mercury (grain 1) intramuscularly twice weekly, and salvarsan or neosalvarsan intravenously at 7 to 10 day intervals during the course of mercury. The response to salvarsan is quicker if the man has previously taken mercurial treatment, and a negative blood has been obtained in a big majority of the cases after three administrations of salvarsan. One long-standing case with bone involvement required 11 doses of salvarsan intravenously before obtaining a negative Wassermann. There were 205 administrations of

¹ From Annual Sanitary Report, Jan. 1, 1915.

neosalvarsan, each 0.9 gram, and 46 administrations of salvarsan, each 0.6 gram; and there were 1,111 injections of mercuric succinimid.

Fifty-three cases of gonorrhea were admitted in all stages and with all complications. The few acute cases had already developed lesions other than those of the urethra. Forty-four out of the fifty-three cases were returned to duty only after the discharge had ceased, the urine had cleared, the cocci had disappeared from the prostatic excretion, and all complications or other gonorrheal infections had dissipated.

In addition to the 53 cases of urethral involvement there were 23 cases of joint infections. No case was invalidated, 18 were sent to duty, and 5 remained under treatment. Our excellent results were due to complete rest of the joints, thorough removal of gonorrheal foci, together with injections of antigonococcic vaccine and succinimid of mercury.

A few cases of stricture were found, all operable by internal urethrotomy. It is worthy of note that the prostate is consistently involved in chronic cases of specific urethritis. One highly interesting case of prostatic abscess was drained by Young's perineal incision and made a good recovery.

MALARIAL PROPHYLAXIS.¹

By H. L. SMITH, Passed Assistant Surgeon, United States Navy.

The general health has been most satisfactory excepting the severe epidemic of malaria, contracted in Tampico, Mexico. This amounted to 102 admissions, 22 readmissions, 735 sick days, and a total loss to the Government of over \$1,000 in the services of the men affected alone. The ship lay in the Panuco River, directly off Tampico, from February 16, 1914, to April 21, 1914, with an occasional trip to the mouth of the river. During this period the ship was well screened and there resulted but four cases of malaria. During the American occupation of Vera Cruz the ship was cleared for action and almost all of the screening was destroyed. The ship was then ordered to move to an anchorage just outside the mouth of the river. On May 11, 1914, the unscreened ship was ordered to return up the river and anchor off the city. She remained there until May 25, 1914, a period of 11 days from which there resulted 98 cases of malaria of the tertian and subtertian types. In addition, 121 men were infected who never became ill—so-called "healthy reservoirs." There were only 74 members of the crew who did not show some type of the malaria parasite upon blood examination. Quinin prophylaxis was rigidly enforced during this period of 11 days' exposure. Every member of

¹ From Annual Sanitary Report, U. S. S. *Des Moines*, Jan. 1, 1915.

the crew and each officer was given 5 grains of quinin daily, with an additional 5 grains every seventh day. A very careful record of this prophylaxis was kept and all offenders were immediately reported to the commanding officer. This epidemic was handled entirely by the medical department of this ship, although the services of additional men of the Hospital Corps were very kindly offered by the fleet surgeon. The quinin was furnished by nearly every ship of the fleet then present in Mexican waters. Too much credit can not be given to Hospital Steward W. M. Benton and his three apprentices. At one time there were nearly 100 men ill with malaria, all requiring very careful nursing.

SANITARY NOTES FROM THE U. S. S. WASHINGTON.¹

By H. A. MAY, Passed Assistant Surgeon, United States Navy.

For a time soon after the ship went south flies became a veritable pest. They were found to be multiplying in decaying potatoes, and promptly disappeared when their breeding places were destroyed.

When vegetables, potatoes especially, are kept on deck in the Navy type wire lockers, the morning swabbing of the decks keeps the bottom third of the vegetables constantly wet, and conduces to rapid decay regardless of the frequency of picking over. As soon as our lockers were emptied the spuds were left in the crates in which they were received, and were stowed over the engine-room hatch, where they could not be wet by water from the deck hose. Decay stopped, the flies disappeared, and a considerable saving in vegetables resulted. A free circulation of air through vegetable containers is, of course, desirable; but the prime requisite in preventing decay is dryness.

There are two items of importance that are, I think, quite commonly overlooked on board ship, viz, the care of coffee kettles and the cleanliness of the ordinary mess towel. At the weekly inspection of the commanding officer coffee kettles are always bright and shining on the outside; but if constant watchfulness is not exercised, a heavy film of grounds mixed with lint and grease is sure to accumulate over the inside and about the spout. This film will not come off during ordinary washing with a cloth, nor will boiling bring it away. It must first be scraped off, and then a daily washing with a clean cloth and clean water will keep the kettles in good condition. Soap or lye should, of course, never be used inside a coffee kettle.

The usual practice with mess towels used to wipe tables, knives, forks, etc., is to spread them on top of the stowed mess tables to dry between meals. On this ship they are scalded three times a day, and hung on wire lines stretched outside the galley gratings, where they

¹ From Annual Sanitary Report, Jan. 1, 1915.

dry quickly. This prevents souring of the heavy towel fabric and the consequent bad odors that arise from them.

The need of a dental officer in every division of the fleet, and especially among ships doing independent duty away from the United States, was very apparent while we were in San Domingo. The suffering from bad teeth among the crews of the various ships in those waters was considerable, and the only relief obtainable was from the native dentists ashore. On the *Washington* we now have a splendid dental office, with a member of the Dental Corps in charge. A good room on the gun deck has been fitted up with all the apparatus necessary for such dental treatment as is approved by the Navy Department.

Venereal disease has been present in the usual number of cases. In San Domingo city, practically the only place where liberty was granted, 45 per cent of all men going ashore applied for prophylactic treatment. Of those exposed about 2.3 per cent contracted disease. Chancroid was more common than usual, and a large proportion of those infected developed buboes. These glandular enlargements, however, were of a mild type, and healing was more rapid after the incision than has been usual in my experience.

After leaving the States in May, the ship lay off the ports of Cape Haitien, Puerto Plata, Vera Cruz, and San Domingo city until the latter part of November. For 10 days at Vera Cruz liberty was allowed the men. At Cape Haitien and Puerto Plata, where we lay for over two months, no one was allowed ashore because of the active revolutionary fighting in those places. After reaching San Domingo city in August liberty was given daily. At none of these places was there any contagion present in epidemic form, except typhoid fever in Puerto Plata, and of this disease none appeared among our men. In this city the water supply to the town had been cut by the belligerent party outside, and the residents were forced to use water that had collected in wells and cisterns.

Where men remain on board ship for weeks at a time, the sick list is prone to become overloaded, not so much with real illness as with men suffering from minor ailments and imaginary troubles. Keeping the crew busy with drills, exercises, and work, even though it may be of an unnecessary character, is a valuable hygienic measure, and tends to prevent introspection and self-pity, elements which lead men to the sick bay.

While lying in Puerto Plata in July and August, active fighting of the revolutionary parties was going on much of the time. On the last two days of July a final battle was fought along the borders of the city, during which about 150 men were killed or injured. As soon thereafter as the authorities ashore would permit, the medical officers of the *Machias* and *Washington* endeavored to render such

assistance to the wounded as might be within our power. A considerable supply of dressings was given to the hospitals of both contending factions. A special report of the conditions found at this time has already been made.

SANITARY NOTES FROM THE U. S. S. MICHIGAN.¹

By J. A. MURPHY, Surgeon, United States Navy.

Water: The supply has been ample without waste. An allowance in coal consumption per gallon of water distilled should be instituted in the steaming competition to obviate the possibility of economy becoming stinginess in supplying water for cleanliness. It is understood that a ship distilling, for instance, 13,000 gallons of water a day against another ship distilling 10,000 gallons gets no credit for the coal expended in making the additional water.

Plumbing: The "Atlantic" type of toilet fixture on this ship requires constant overhauling to keep it in only fair working order. This is particularly so in the wardroom officers' toilet, which, owing to its high location, appears to be difficult to supply with sufficient flushing water. The valve connections in the fixture soon corrode (salt-water flushing) and the valve seats leak in consequence. They also become coated with fecal matter and can not be cleaned in the fixed position. The frequent dismantling exposes the ship to infection, as the contaminated parts are handled within the ship's living compartments. The water seal is never continuously present, owing to the leaky joints, and odor is always noticeable from the interior of the considerable length of soiled pipe. The overflow holes lead to a cavity within the bowl, which also adds to the odor, as it is not closed off by the water seal even when the seal is present. To avoid the defects mentioned it has been several times recommended that simple S-trapped fixtures (house), made heavy enough, perhaps, to withstand gunfire, be introduced aboard ship for locations above the water line. As long ago as 1900 on the U. S. S. *Solace*, and more recently on the U. S. N. A. *Orion*, such fixtures were found to be giving satisfactory service. Flushing tanks should be made deeper than usual, or of the closed type, to prevent slopping over when a ship is in a seaway.

Heating: Ample. Evaporating pans or other means should be added to steam radiators to supply moisture to the air. Dry air cakes the mucus in the nose, resulting in ulceration and consequent illness, due to infection through the abraded areas. Much discomfort is also caused by the sense of obstruction in the nose due to the caking of the mucus and drying of the mucous membrane.

¹ From Annual Sanitary Report, Jan. 1, 1915.

SANITARY NOTES FROM THE U. S. S. PALOS.¹

By D. C. POST, Assistant Surgeon, United States Navy.

All men of the crew have been vaccinated against typhoid fever. While in Chungking, China, our crew was granted the freedom of use of the British canteen until it closed because of the war. During that time among 56 enlisted men there occurred five cases of typhoid fever on H. M. S. *Widgeon* and *Teal*. The crews of these ships have not been vaccinated against typhoid fever. While our men were intimately associated with the crews of these ships daily on liberty, no case occurred on the *Palos*.

Two cases of abscess of lymph node occurred while the *Palos* was on the upper river. These were clearly proved to be nonvenereal; nor could the primary focus of infection or port of entry be found, as there were no open lesions anywhere to be found. The suppuration which took place was very resisting to any form of treatment and the patients showed little or no febrile reaction (never above 100°), but peculiar constitutional weakening, which responded to ascending doses of iron and arsenic.

It has been found that with the careful watching of the food and drinking water and forbidding the men to eat any food ashore, except where great care was used in its preparation, the health of the crew will remain, on the average, good.

One case of amebic dysentery, proved by microscopical findings ashore, occurred above the gorges. Emetin therapy caused prompt cessation of symptoms and restoration of health.

A case of schistosomiasis occurred also in Chungking, which case is thought of sufficient importance to report in a later letter. Salvarsan, 0.6 gram intravenously, produced prompt recovery where all other measures failed.

With infection everywhere, flies and dust, it is impossible to prevent the invasion of these diseases, but careful personal hygiene and care of food has been a great factor in that direction.

CAMP SANITATION.²

By R. I. LONGABAUGH, Passed Assistant Surgeon, United States Navy.

Camp Howard, established on North Island, San Diego, Cal., was an ideal camp site. Although terribly dusty at first, this was later controlled by sprinkling and rolling. The ground was very porous, and rains, therefore, gave little trouble.

¹ From Annual Sanitary Report, Jan. 1, 1915.

² From Annual Sanitary Report Fourth Regiment United States Marines, Jan. 1, 1915.

Possibly the three most important sanitary measures had to do with the disposal of human excreta and garbage and the suppression of flies.

At first latrines were dug in the sand for human excreta. Twice daily these were filled with brush, over which crude oil was poured, and the whole burned. When cool, lime was freely sprinkled over the mass. This method was entirely satisfactory except for the fact that the latrines filled rapidly. Later toilets were built over the bay beyond the low-water mark and fully and satisfactorily settled the question of disposal of human excreta.

Wet garbage and urine from night cans were emptied into a sink and carried out by pipe line beyond the low-water mark. The free use of crude oil and crude carbolic kept this drain sweet. Dry garbage was burned in a rock-pile incinerator, after the free use of crude oil. These two methods proved entirely satisfactory and easy of application.

The chief source of flies, therefore, was the manure of horses belonging to a civilian contractor. These horses were kept on the lee side of the camp at a distance of about 500 yards. The stables were finally taken in hand by the police sergeant and the following routine carried out: Horse manure burned daily in incinerator; stables moved once a week and the ground spaded to a depth of 15 inches and burned with brush and crude oil; powdered borax then sprinkled over the area and raked in. Unquestionably borax (*vide* Naval Medical Bulletin, October, 1914, p. 699) is the best larvacide for flies that we used, and possesses the additional advantage of not hurting the horses' feet.

Of course, cleanliness about kitchens and mess tents, store tents, post-exchange, and issue tent was at all times enforced. The result of this campaign was that there were comparatively few flies in camp.

The health of men in general was excellent. There were really very few serious illnesses, and a goodly proportion of sick days came from injuries received in authorized athletic sports.

SANITARY INSTRUCTIONS.

Camp diseases are preventable; their presence in a command means that the laws of hygiene have been violated. In ordinary campaigns sicknesses have disabled from 5 to 10 times as many men as wounds.

CARE OF FEET.—Neglect of feet should be considered a punishable offense. The shoe is the most important single article of the uniform. The regulation shoe should be worn without exception, unless on advice of the medical officer. Shoes should be large enough in all directions but not large enough to slip up and down, or rub.

Toenails should be cut straight across a very little behind the end of the toe. The least soreness around the toenails should be reported to the medical officer. For corns, soak the feet well in hot water and trim the corn or callus down with a sharp knife, being careful not to draw blood.

Blisters, save the skin; drain at the lowest point with a clean needle; protect, if possible, with cotton and plaster.

The feet should be washed or rubbed off with a wet cloth within two hours after reaching camp and clean, dry socks put on. The plentiful use of talcum powder will do more to prevent sore feet than any other one thing. A daily bath and rub down is desirable; on the march the feet and groins should be cleansed even though only a damp cloth is available.

SOURCES OF DANGER.—Mosquitoes, flies, dust, water, food, drinking cups.

Mosquitoes by their bites transmit yellow fever and malarial fever. In the Tropics these diseases are severe and may be rapidly fatal. The use of a mosquito net will absolutely prevent these diseases. Flies carry on their dirty feet germs of many diseases, such as typhoid fever, dysentery, cholera, and diarrhea, from sinks and urinals to uncovered food, water, and food receptacles. A single female fly lays about 120 eggs, which hatch in about one week. The eggs are laid in putrid matter of sinks and manure, and are hatched thereby. A clean camp is the remedy.

Only boiled or distilled water, protected from contamination, should be used. On going into even a temporary camp the water supply should be placed immediately under intelligent supervision and its approach protected.

Dust may carry dry filth laden with germs of diseases. Uncooked milk, soft drinks, and raw foods should be prohibited without exceptions.

Drinking cups, eating utensils, lead pencils, plug tobacco, and the like should not be passed around. They have been known to spread diseases like syphilis, diphtheria, mumps, and measles.

Men should not sleep directly on the ground if it can be avoided. They should raise their beds by leaves, boughs, or other means.

Old camp grounds should be avoided. A slope and high, well-drained ground is desirable. The wind should blow away from the camp toward a marsh and toward the sinks. Avoid places with very rank vegetation.

On halting for the day the first duty should be the posting of sentries over water supply and the designating of a place for the sinks. Sinks should be 2 feet wide at the top, 12 to 20 feet long, and 3 to 10 feet deep, depending on the probable length of stay. Earth should be thrown to the rear and used to cover in to the depth of 2 to 3 inches three times a day. Sinks should be burned out with petroleum at least once a day. Quicklime should be used to cover defecations if available. Urinals should be conveniently located and kept under control to prevent soil pollution. Filthiness in camp is an offense against health as well as an offense against decency.—(U. B. WEBB, SURGEON, U. S. N.)

LYMPATHIC LEUKEMIA COMPLICATED BY PRIAPISM.

At the February meeting of the pathologic section of the Buffalo Academy of Medicine, Dr. D. S. Hepburn, pathologist at the Buffalo Homeopathic Hospital, read an interesting paper, in which he reported a case of lymphatic leukemia, complicated by priapism. Hepburn referred to an article on priapism by Frank Hinman (*Annals of Surgery*, December, 1914), in which priapism was divided into—

1. Cases due to nervous causes.
2. Cases due to mechanical causes.

Mechanical causes were subdivided into—

- (a) Thrombosis.
- (b) Hemorrhage and hematuria.
- (c) New growths of the penis.
- (d) Inflammatory swelling and edema of the penis.

Hinman stated that 27 per cent of his series were associated with leukemia and gout; 7 per cent had a duration of 20 to 60 days.

In the case reported by Hepburn the patient lost 60 pounds in three months and complained of weakness and constipation. He had an attack of priapism January 21, 1915. The attack appeared in the morning and lasted two hours. Priapism appeared again February 17. The patient tried to evacuate bowels, and had an emission. He was referred to Dr. James Gardner for urological examination and a provisional diagnosis of leukemia was made. The blood was examined by Dr. Hepburn and showed: Hemoglobin, 70 per cent; disks, 3,700,000; leukocytes, 1,014,000; small lymphocytes, 95 per cent; large lymphocytes, 3 per cent; neutrophiles, 2 per cent. The percentage of uric acid in the urine was 0.17.

Physical examination showed priapism; spleen enlarged to level of umbilicus; impossible to determine enlargement of liver because of abdominal obesity. Physical examination otherwise negative.

The diagnosis of chronic lymphatic leukemia was thus made apparent, and the cause of the priapism was evidently mechanical. Dr. Gardner therefore incised the right corpus cavernosum on February 21 and removed about 2 ounces of thick, grumous blood clot. This immediately relieved the priapism.

The points of interest in the case were:

1. The absence of enlarged peripheral lymph nodes.
2. The larger number of leukocytes than is usually found in this condition. In one of Cabot's series (34 cases) 180,000 leukocytes per c. mm. was the average count and only one case rose above 1,000,000 cells.
3. The priapism present: Cabot says that priapism due to leukemic infiltration or thrombosis of the corpora cavernosa has been repeatedly mentioned in literature, but strangely enough did not occur in any of the 89 cases of his series.
4. The increased amount of uric acid in the urine: In Osler's work the following is said of this condition:

The most striking and important feature in the urine (in leukemia) is the great excess of uric acid, due to the breaking down of the nuclei from the death of the white cells. In no other disease is so great an increase of uric acid so regularly found, and it is an interesting fact that most of the symptoms often attributed to an excess of uric acid in the system are not found in leukemia.

In this case the uric acid was 0.17 per cent, as compared to 0.05, the normal percentage.—(Reported by J. J. A. M'MULLEN.)

THE SEVENTY-FIRST ANNUAL MEETING OF THE AMERICAN MEDICO-PSYCHOLOGICAL ASSOCIATION. Old Point Comfort, May 11 to 14, 1915.

The meeting was well attended, especially by the prominent psychiatrists of the eastern United States. The first day was largely given up to organization and in the afternoon to a symposium of papers on the care and occupation of the insane. The program was quite long and attention is given only to those papers of general interest.

"Some Practical Tasks in Mental Hygiene."

THOMAS W. SALMON, M. D., New York, N. Y.

Abstract: Mental hygiene, as correctly used in its broadest sense, denotes a vast field of prevention. Eugenics, education, social adoption, as well as protection against all exogenous factors which may menace the integrity of the nervous system, are properly within the scope of mental hygiene even though some of them are so important as to seem to constitute separate fields. In the broader issues, practical tasks are relatively few; what is impractical to-day may, with new knowledge, become practical to-morrow. Examples: Discussion of some of the tasks in mental hygiene which seem practical to-day with knowledge already in our possession; some tasks which seem especially the work of the public hospitals for the insane; what is already being done. How the societies for mental hygiene can co-operate with the hospitals in these tasks; how the hospitals cooperate with the societies for mental hygiene.

"Recidivation in Insanity, with Considerations on Classifications."

GEORGE VILLENEUVE, M. D., Montreal, Quebec.

Abstract: A study of nearly 6,000 cases. A percentage has been established for each form of mental disease. The special interest of this paper lies in the fact that most of the patients admitted and readmitted were personally known to the author, and that the population dependent on the hospital being very stationary the cases of recidivation would likely have been returned there, thus giving a fairly accurate view of recidivation.

"A Further Study of Brain Anatomy in Manic-Depressive Psychoses."

E. E. SOUTHARD, M. D., Boston.

Abstract: This study is a continuation of the valuable work along these lines done by the author. It follows the lines of the photographic study of dementia precox, published in October, 1914, and January, 1915, in American Journal of Insanity, employing the same synoptic views of the brain from the standpoint of gross photography of the external surfaces and selected surfaces of the frontal sections.

"Methods of Promoting the Nutrition in the Psychoses."

SANGER BROWN, Kenilworth, Ill.

Abstract: Attention invited to the importance of mental attitude, use of forced feeding, heat rest, sound-proof rooms, and ventilation.

"The Dementia Precox Problem."

HENRY A. COTTON, M. D., Trenton, N. J.

Abstract: The need of a more careful study of the physical condition in dementia precox, the importance of the study of metabolism, value of Abderhalden reactions; the anatomical findings indicate the organic nature of the disorder; these findings used as a basis for further metabolism studies; the rôle of the glands of internal secretion as shown by defective metabolism. Anatomical studies in dementia precox should include all the glands of internal secretion. The rôle of psychogenic factors also important.

"The Relation of Angular Gyrus Lesions to Catatonia."

E. E. SOUTHARD and M. M. CANAVAN, Boston, Mass.

Abstract: In connection with claims by one of the two writers concerning the parietal lobe of correlations of catatonia, two rather striking cases are offered, showing sharply defined isolated lesions of the angular gyrus of a superficial nature—one a superficial cyst of softening, the other a solitary tubercle. Some account is given of an analysis of other cases of angular gyrus lesions in Massachusetts State Hospital material.

"The Treatment of Paresis."

BRITTON D. EVANS, M. D., Morris Plains, N. J.; FREDERIC H. THORNE, M. D., Morris Plains, N. J.

Abstract: The number of cases treated; description of technic governing treatments. The course taken by the cerebrospinal fluid after leaving the choroid plexus being in favor of the efficiency of this method of treatment, the cell count as an index to improvement. The variations observed in the intensity of the Wassermann reaction in treated and untreated cases. The value of the treatments. This paper contained nothing new.

"The Intra-Cranial Injection of Salvarsanized Serum."

DREW M. WARDNER, M. D., Cedar Grove, N. J.

Abstract: 1. The rationale of the procedure. 2. A brief résumé of the technic. 3. The results obtained by Saroditts and others. 4. Their own results after 18 months' experience. 5. Concluded that it is of value in cases not amenable to other treatment. However, the time elapsed is too short to allow opinions of value to be formulated.

"The Psychoses of the High Imbecile."

HENRY J. BERKLEY, M. D., Baltimore, Md.

Abstract: The object of this paper is to stimulate observation of the psychoses of the moron class; to show that they are more prone to them than normal man; that practically all forms of adolescent

insanities are found among them, though a number are represented in modified form; that spirituous liquors (as well as drugs) are especially pernicious to them, also that the after effects are more pronounced than those possessing a sound mentality; that the corner stone of a vast majority of the delusions and hallucinations that possess them are of alcoholic origin; finally, that few imbeciles having entered upon a psychosis emerge from it with their former mentality, but that a terminal dementia of quick onset is the rule.

"Some Calculated Phases of Immigration in Relation to Insanity."

A. J. ROSANOFF, M. D., Kings Park, N. Y.

Abstract: It has been stated that insanity is 2.19 times as frequent in the foreign as in the native population in the State of New York. When correction is made, allowing for the difference in age distribution and in percentage of town dwellers, this figure is reduced to 1.24. Who knows what further allowance for less obvious sources of error might have to be made? The cross-country migration from the eastern to the western coast presents a similar phenomenon. Natives of New York who have migrated to California furnish 2.60 times as many admissions to the State hospitals there as native Californians. It would seem that the better way of judging the comparative existence of insanity in the native and foreign racial elements would be by comparing the first admissions of natives born of native parentage with those of natives born of foreign parentage. In the year 1911 in the State of New York such admissions were, respectively, 34.6 and 34.9 for a hundred thousand of the general population, i. e., practically identical for these two elements of the population. The much-feared menace of the increased existence of insanity in future generations as resulting from immigration is not real but imaginary.—(Reported by R. SHEEHAN.)

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This United States Naval Medical Bulletin is published by direction of the Department for the timely information of the Medical and Hospital Corps of the Navy.

TRUMAN H. NEWBERRY,
Acting Secretary.

NOTE.

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April, 1907, Volume I, number 1.
July, 1907, Volume I, number 2.
January, 1908, Volume II, number 1.
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April, 1911, Volume V, number 2.
January, 1912, Volume VI, number 1.
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January, 1914, Volume VIII, number 1.
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PREFACE.

The publication and issue of a quarterly bulletin by the Bureau of Medicine and Surgery contemplates the timely distribution of such information as is deemed of value to the medical officers and the Hospital Corps in the performance of their duties and with the ultimate object that both shall continue to advance in proficiency in respect to all of their responsibilities.

It is proposed that the Naval Medical Bulletin shall embody matters relating to hygiene, tropical and preventive medicine, pathology, laboratory suggestions, chemistry and pharmacy, advanced therapeutics, surgery, medical department organization for battle, and all other matters of more or less professional interest and importance under the conditions peculiar to the service and pertaining to the physical welfare of the naval personnel.

It is believed that the corps as a whole should profit, to the good of the service, out of the experience and observations of the individual. There are many excellent special reports and notes beyond the scope of my annual report being sent in from stations and ships, and by communicating the information they contain (either in their entirety or in part as extracts) throughout the service, not only will they be employed to some purpose as merited, but all medical officers will thus be brought into closer professional intercourse and be offered a means to keep abreast of the times.

Reviews of advances in medical sciences of special professional interest to the service, as published in foreign and home journals, will be given particular attention. While certain medical officers will regularly contribute to this work, it is urged that all others cooperate by submitting such abstracts from the literature as they may at any time deem appropriate.

Information received from all sources will be used, and the bureau extends an invitation to medical officers to prepare and forward, with a view to publication, contributions on subjects relating to the profession in any of its allied branches. But it is to be understood that the bureau does not necessarily undertake to indorse all views and opinions expressed in these pages.

W. C. BRAISTED,
Surgeon General, United States Navy.

U. S. NAVAL MEDICAL BULLETIN.

VOL. 9.

OCTOBER, 1915.

No. 4.

SPECIAL ARTICLES.

OBSERVATIONS UPON THE EPIDEMIOLOGY OF AN OUTBREAK OF MEASLES AT THE NAVAL TRAINING STATION, NORFOLK, VA.

By C. E. RIGGS, Surgeon, United States Navy.

For some time there has been a growing tendency of epidemiologists to ascribe the spread of an epidemic disease to actual contact with the infected individual, and the rôle played by fomites, toys, furniture, and other articles through indirect contact has lessened correspondingly. The view is now accepted that germs, particularly those of the acute exanthemata, are short lived outside the body, and that under these circumstances sunlight, fresh air, and dryness are efficient disinfecting agents. Consequently it is now seriously questioned whether or not terminal disinfections have any value in preventing the spread of these epidemics, and our quarantines can be more liberal, as our endeavor is merely to keep the infected person from coming into direct contact with a susceptible individual, and little attention need be paid to the indirect contact of such persons.

Observations upon an epidemic of 65 cases of measles which took place at this station last winter seem to bear out these views. This epidemic can be traced from its beginning at Texarkana, Tex., by the exposure of an applicant who subsequently enlisted, till its termination by a few cases in the fleet measles camp at Guantanamo, Cuba.

A brief description of this station and the route of the recruit through the station to the fleet will serve to a better understanding of the epidemiology of this outbreak of measles.

The station consists of three fairly well isolated centers.

1. Detention camp, which receives the recruit, consists of a large mess hall and 35 attached bungalows to house the recruits.

2. Main camp next receives the recruit and consists of a large mess hall and 135 bungalows for housing.

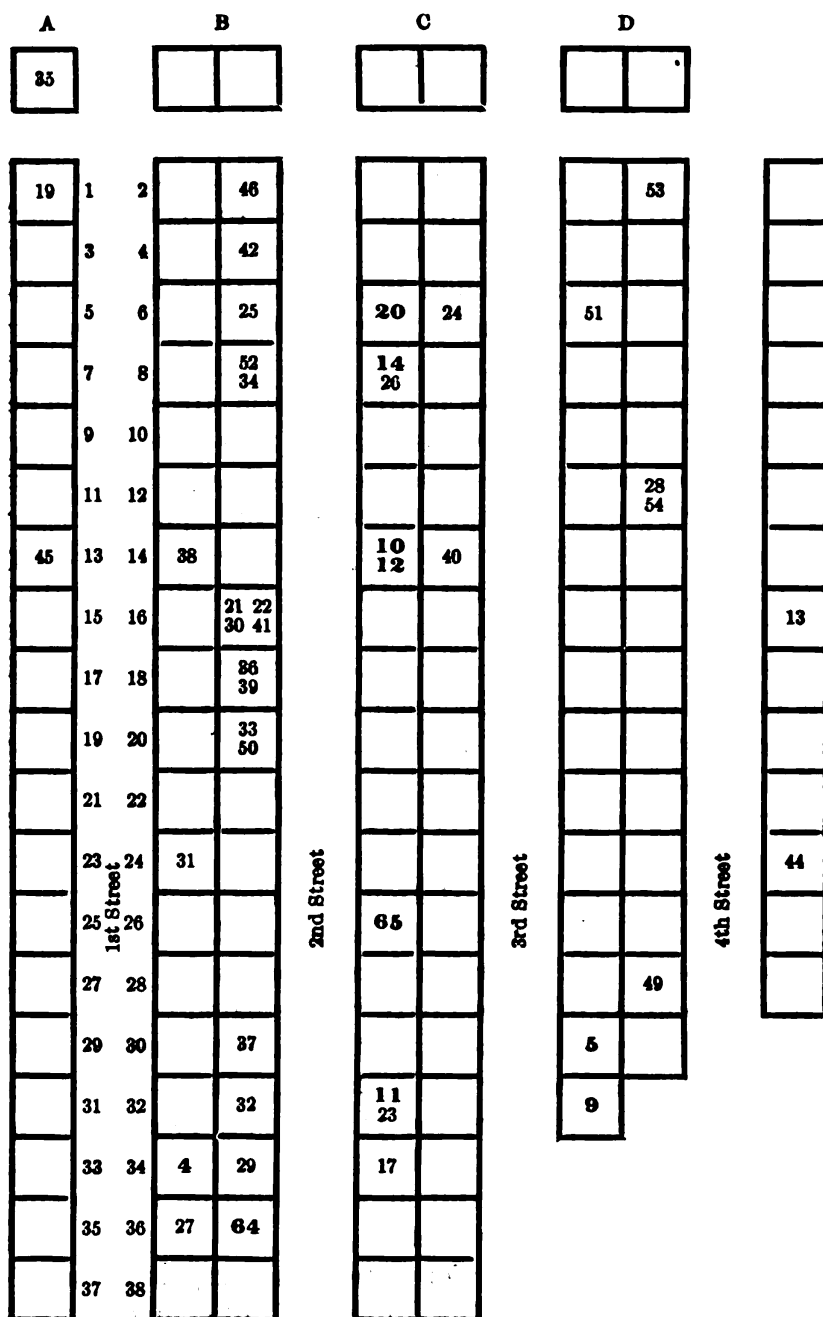
3. The ships receive the recruit upon graduation from main camp and from there he goes to the fleet.

The number of inhabitants for detention camp is about 250, for main camp about 850, and for the ships 1,000; of course, there is more or less flow from detention to main camp, from main camp to the

ships, and from the ships to the fleet, and naturally this is the route actually taken by the epidemic about to be described.

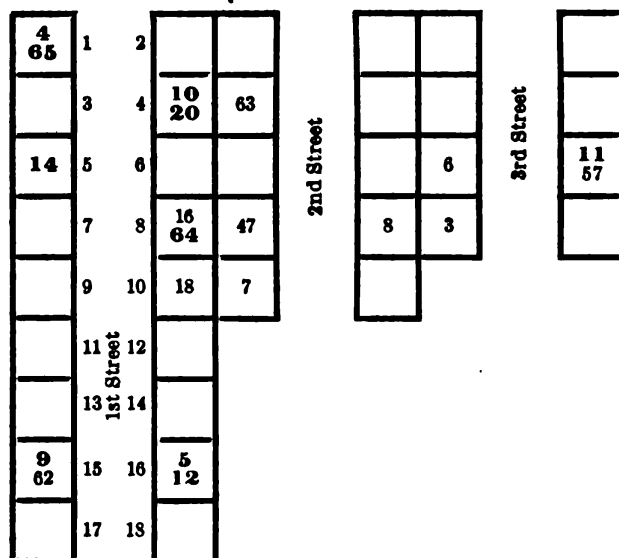
The bungalow method of housing recruits is, I believe, peculiar to this station. The bungalows are arranged in streets and numbered, and the accompanying diagrams show their arrangements at detention and main camps.

DIAGRAM OF BUNGALOWS AT MAIN CAMP.



The odd numbers are on the left and the even on the right of each street.

DIAGRAM OF BUNGALOWS AT DETENTION CAMP.



The ships have no attached bungalows. The bungalows are wooden structures, extremely airy, having a capacity for six men. They have no windows, and light and air are admitted by raising the canvas curtain which extends around the bungalow. The door is also a canvas curtain. Such method of housing is, of course, only permissible where the winters are mild.

This epidemic of measles was of an unusually severe type for adults. Medical Director Pickrell, United States Navy, who saw practically all of the 65 cases, stated that it was the most virulent form of measles he had seen in the Navy. Three of the cases terminated fatally, giving a mortality of 4.6 per cent. The initial rise of temperature was nearly always high. In most cases it was above 103° , and in a number of cases it was above 105° . These observations apply only to the catarrhal stage, as when the diagnosis was confirmed by the appearance of Koplik spots or the rash the case was immediately transferred to the isolation camp at the naval hospital.

The 65 cases are arranged in the following table, and each case is given a number by which it can be referred to if required in further discussion:

Case No.	Date of appearance of rash.	In sick quarters prior to rash.	Company.	Camp.	Street.	Bungalow.	School section.
		<i>Days.</i>					
1.....	Jan. 19, 1915	3		D.....	Receiving dock.....		
2.....	Feb. 2, 1915	3		D.....	Gymnasium.....		
3.....	Feb. 3, 1915	2		D.....	Third.....	7	
4.....	do.	1	M.....	M.....	First.....	36	6
5.....	do.		M.....	M.....	Third.....	32	1
6.....	Feb. 8, 1915	2	O.....	D.....	do.....	7	
7.....	do.	3	N.....	D.....	Second.....	9	
8.....	Feb. 9, 1915	3	N.....	D.....	do.....	8	
9.....	Feb. 10, 1915		M.....	M.....	Third.....	34	1
10.....	do.	2	M.....	M.....	Second.....	14	4
11.....	Feb. 11, 1915		N.....	M.....	do.....	32	6
12.....	Feb. 12, 1915	1	M.....	M.....	do.....	14	5
13.....	do.		E.....	M.....	Fourth.....	16	5
14.....	Feb. 13, 1915	2	M.....	M.....	Second.....	8	3
15.....	do.	13		D.....	Sick quarters.....		
16.....	do.	1		D.....	First.....	8	
17.....	Feb. 15, 1915		K.....	M.....	Second.....	36	3
18.....	do.	1	O.....	D.....	First.....	10	
19.....	do.	4	D.....	M.....	do.....	1	6
20.....	do.		M.....	M.....	Second.....	6	2
21.....	do.		B.....	M.....	do.....	15	3
22.....	do.		B.....	M.....	do.....	15	4
23.....	do.	3	K.....	M.....	do.....	32	3
24.....	Feb. 16, 1915		I.....	M.....	Third.....	5	4
25.....	do.		B.....	M.....	Second.....	5	2
26.....	do.	4	C.....	M.....	do.....	8	4
27.....	do.		S. S.....	M.....	First.....	38	
28.....	do.		H.....	M.....	Fourth.....	11	6
29.....	do.		K.....	M.....	Second.....	33	6
30.....	do.		B.....	M.....	do.....	15	1
31.....	Feb. 17, 1915	1	F.....	M.....	First.....	24	6
32.....	do.	4	K.....	M.....	Second.....	31	1
33.....	do.		L.....	M.....	do.....	21	3
34.....	Feb. 18, 1915	4	B.....	M.....	do.....	7	2
35.....	do.		D.....	M.....	First.....	A	4
36.....	do.	1	L.....	M.....	Second.....	17	3
37.....	do.	3	K.....	M.....	do.....	29	3
38.....	do.		F.....	M.....	First.....	14	4
39.....	do.		B.....	M.....	Second.....	17	5
40.....	Feb. 19, 1915	1	I.....	M.....	Third.....	13	6
41.....	do.		B.....	M.....	Second.....	15	4
42.....	Feb. 20, 1915	1	L.....	M.....	do.....	3	1
43.....	do.			D.....	Receiving dock.....		
44.....	do.	5	E.....	M.....	Fourth.....	26	5
45.....	Feb. 21, 1915	2	D.....	M.....	First.....	13	2
46.....	do.		L.....	M.....	Second.....	1	1
47.....	do.	3	P.....	D.....	do.....	7	
48.....	do.			R. S.....			
49.....	Feb. 22, 1915		E.....	M.....	Fourth.....	29	5
50.....	do.		L.....	M.....	Second.....	21	6
51.....	Feb. 23, 1915		G.....	M.....	Third.....	6	4
52.....	do.	1	L.....	M.....	Second.....	7	3
53.....	do.		H.....	M.....	Fourth.....	1	1
54.....	Mar. 1, 1915	2	H.....	M.....	do.....	11	6
55.....	Mar. 2, 1915	1		R. S.....			
56.....	do.	3		R. S.....			
57.....	Mar. 3, 1915	1	P.....	D.....	Third.....	6	5
58.....	do.	2		R. S.....			
59.....	Mar. 4, 1915			R. S.....			
60.....	Mar. 16, 1915			R. S.....			
61.....	Mar. 18, 1915			R. S.....			
62.....	Mar. 19, 1915	1	Q.....	D.....	First.....	15	1
63.....	Mar. 31, 1915		R.....	D.....	Second.....	3	1
64.....	do.		Q.....	M.....	do.....	37	5
65.....	Apr. 1, 1915	1	Q.....	M.....	do.....	26	1

NOTE.—S. S.—Signal squad. Camps: M.—Main camp; D.—Detention camp. R. S.—Ships.

The cases are purposely arranged in the order of the appearances of the rash, as it is believed that in measles the period of time from infection till the rash appears is one of the most constant factors in epidemiology. The initial rise of temperature, were it possible to obtain it, would probably be still more constant. The column indicated by days in sick quarters is given because it represents a period during the preeruptive stage of more or less isolation. Naturally all "colds" were under suspicion, and if the case could not give a history of having had measles, and in particular if it came from a company in which cases of measles were appearing, the case was given such isolation as our facilities permitted. The difficulty of isolating suspicious "colds" was added to by the prevalence at this time of an epidemic of influenza. Three hundred and fifteen cases of influenza were admitted to the sick list during the period covered by this epidemic and probably as many more were treated. The facilities at the main camp to isolate suspicious colds were superior to either of the other two places on account of four bungalows attached to sick quarters there. It appears that this is reflected in the excellent result obtained in controlling the epidemic, for if we consider only the cases infected there all but 2 of the 34 cases appeared between February 14 and 24, covering a period of 9 days. A census of the camp at this time gives the number of boys present who could not give a history of having had measles as 152, or 18 per cent.

The column "company" happens to be in all cases not only the company in which the patient was serving at the time of the appearance of the rash, but it is also the company in which he was serving at the time of his infection. That is, he served in the same company at least 14 days prior to the appearance of the rash. Each company contained about 80 men. The remaining columns, "camp," "street," "bungalow," and "school section," locate the patient at the time of the appearance of the rash or at the time of his transfer to sick quarters. With the exception of 10 cases they also locate the patient at the time of infection. The excepted 10 cases were infected at detention camp and transferred to main camp before taken sick. They are the 7 cases of Company M, case No. 11 of Company N, and cases Nos. 64 and 65 of Company Q.

Case No. 1, of January 19, is the one which brought the epidemic from Texarkana to this station. It occurred in a recruit named X—, who arrived on this station January 16 and was transferred to isolation camp January 19. His eruption appeared January 17, but was not discovered till the 19th. He was evidently capable of

transmitting infection during all the time of his stay at this station. X—— was a very sociable fellow, with a tendency to do most of the talking. On the evening of January 18 he discovered that case No. 2 was from the same State as himself, and he had a long talk with him. No. 2's rash was discovered 14 days later. X—— had traveled from Dallas, Tex., with cases No. 3 and No. 6, and during his stay at the station he continued his acquaintance with them by talking to them every day. Case No. 8 had formed a friendship with No. 2, having traveled with him from Texas to this station. These two cases were not housed in the same bungalow, nor associated in any way, except that they always met at mess for a talk. Case No. 8 was friendly with both No. 1 and No. 2, therefore it is difficult to determine from which he received his infection. If from No. 1, we must allow 21 days as the period from infection till the appearance of the rash. If from No. 2, his rash appeared but 7 days later than No. 2's rash. The latter seems more likely, as their habit of meeting for conversation at mess, where there is a considerable hum of noise, would tend to early infection by the droplet method. No. 1 discovered that No. 4 was from the same State as himself, and as far as either can remember they had but one talk before No. 1 went to isolation camp.

Investigation, then, of the early cases of the epidemic points to the droplet method as the only method of transmission of the disease, for two reasons—first, because opportunity for such means of transmission can be shown to have existed, and, second, on account of their duties and locations there is an absence of any other form of contact. Measles is so extremely infectious that its virus has been frequently spoken of as being "air borne." This air-borne theory is hardly given serious consideration nowadays, but if it and similar theories have any value this should be manifest in a tendency of secondary cases to occur in bungalow mates and in those occupying adjacent bungalows. In the diagrams of main and detention camps the numbers within the bungalows locate the case of the corresponding numbers in the tables. The heavy-faced numbers are the 10 cases infected at detention camp and transferred to the main camp during their period of incubation. There exists practically no tendency for the disease to spread within the bungalows nor to adjacent bungalows. Of course, case No. 54 is secondary to case No. 28, as they occupied the same bungalow, were in the same school section, and the interval between rashes is 14 days. Also, case No. 4 probably infected case No. 27, of the adjacent bungalow, by talking to him, as it can not be shown that they were associated in any other way; and case No. 12 is probably secondary to case No. 5, as they occupied the same bungalow at the detention camp prior to transfer, February 2.

The organization at main camp is more complete and fixed than at either of the other two places, so the following tables were prepared.

Company.	Case No.	Date.	Street.	Bungalow.	School section.
M.....	4	Feb. 3, 1915	First.....	36	6
	5	Feb. 5, 1915	Third.....	32	1
	9	Feb. 10, 1915	do.....	34	1
	10	do.....	Second.....	14	4
	12	Feb. 12, 1915	do.....	14	5
	14	Feb. 13, 1915	do.....	8	3
E.....	20	Feb. 15, 1915	do.....	6	2
	13	Feb. 12, 1915	Fourth.....	16	5
	44	Feb. 20, 1915	do.....	26	5
	49	Feb. 22, 1915	do.....	29	5
K.....	17	Feb. 15, 1915	Second.....	36	3
	23	do.....	do.....	32	3
	29	Feb. 16, 1915	do.....	33	6
	32	Feb. 17, 1915	do.....	31	1
	37	Feb. 18, 1915	do.....	29	3
D.....	19	Feb. 15, 1915	First.....	1	6
	35	Feb. 18, 1915	do.....	HB	4
	45	Feb. 21, 1915	do.....	13	2
B.....	21	Feb. 15, 1915	Second.....	15	4
	22	do.....	do.....	15	4
	25	Feb. 16, 1915	do.....	5	5
	30	do.....	do.....	15	1
	34	Feb. 18, 1915	do.....	7	2
	39	do.....	do.....	17	5
I.....	41	Feb. 19, 1915	do.....	15	4
	24	Feb. 16, 1915	Third.....	5	4
	40	Feb. 19, 1915	do.....	13	6
C.....	26	Feb. 16, 1915	Second.....	8	4
SS.....	27	do.....	First.....	38	5
H.....	28	do.....	Fourth.....	11	5
	53	Feb. 23, 1915	do.....	1	1
	54	Mar. 1, 1915	do.....	11	5
F.....	31	Feb. 17, 1915	First.....	24	6
	38	Feb. 18, 1915	do.....	14	4
L.....	33	Feb. 17, 1915	Second.....	21	3
	36	Feb. 20, 1915	do.....	17	3
	42	do.....	do.....	3	1
	46	Feb. 21, 1915	do.....	1	1
	50	Feb. 22, 1915	do.....	21	6
G.....	52	Feb. 23, 1915	do.....	7	3
	51	do.....	Third.....	6	4

All of these cases were infected at main camp, except those of Company M, which is included, however, as it introduced the disease there on arrival February 2. The grouping is arranged by companies, and they are arranged in the order of the appearance of the first case in each company. The case number identifies the case in the previous tables and in the diagrams. If we exclude companies having not more than two cases, we find that there is a tendency to infection by school section, except in companies M and D. Company M was divided into school sections subsequent to its infection; therefore any grouping in this company would be accidental, and it happens there is none. In the organization at main camp each company is divided into six school sections. In Company E all cases are from the fifth school section. Three of the five cases in Company K are from the third school section. The school sections of Companies K and L were united—that is, they went to school together—and three of the six cases in Company L are also from the

third school section. B and C went to school together, and 50 per cent of their cases are from the fourth school section. On February 9 the school sections of Companies M and L were united. Therefore we have cases Nos. 42 and 46 of the first school section of L as probably secondary to case No. 9 of the first school section of M.

We find, then, that the school section appears as an epidemiological factor from two points of view. That is, when a company is infected after having been divided into school sections there is a marked tendency for infection to take place by school sections, and also when a secondary case appears in a company or companies united by school sections, it can always be traced to the same school section. For instance, case No. 49, of February 22, is probably secondary to case No. 13, of February 12, as they are both from the fifth school section. Case No. 54 is clearly secondary to case No. 28.

The form of contact in the school section which transmits the disease is in all probability the droplet method. The scholars sit at opposite sides of a long table, and there is some conversation, coughing, and sneezing during school and also at the beginning and closing of each school period. Another form of contact which suggests itself, and which is along the same lines, is the drinking fountain. Between school periods a section will crowd around one of these fountains to drink. The Gates drinking fountain is used here. It was designed for use aboard ship, where economy of fresh water is a consideration. If the cup does not drain well, as occasionally happens, it amounts not only to drinking from the same cup, but of the same water.

The spread of the epidemic at each camp and on the ships is shown, as follows:

Date.	Deten- tion camp.	Main camp.	Ships.	Date.	Deten- tion camp.	Main camp.	Ships.
Jan. 19, 1915.....	1	.....	.....	Feb. 21, 1915.....	1	2	1
Feb. 1, 1915.....	1	.....	.....	Feb. 22, 1915.....	.....	2	.....
Feb. 3, 1915.....	3	.....	.....	Feb. 23, 1915.....	.....	3	.....
Feb. 8, 1915.....	2	.....	.....	Mar. 1, 1915.....	.....	1	.....
Feb. 9, 1915.....	1	.....	.....	Mar. 2, 1915.....	.....	.....	2
Feb. 10, 1915.....	2	.....	.....	Mar. 3, 1915.....	1	.....	1
Feb. 11, 1915.....	1	.....	.....	Mar. 4, 1915.....	.....	.....	1
Feb. 12, 1915.....	1	1	.....	Mar. 16, 1915.....	.....	.....	1
Feb. 13, 1915.....	3	.....	.....	Mar. 18, 1915.....	.....	.....	1
Feb. 15, 1915.....	2	5	.....	Mar. 19, 1915.....	1	.....	.....
Feb. 16, 1915.....	.....	7	.....	Mar. 31, 1915.....	2	.....	.....
Feb. 17, 1915.....	.....	3	.....	Apr. 1, 1915.....	1	.....	.....
Feb. 18, 1915.....	.....	6	.....	Total.....	24	34	7
Feb. 19, 1915.....	.....	2	.....			
Feb. 20, 1915.....	1	2	.....			

This table gives the number of rashes that appeared each day, and the cases themselves are credited to the locality at which they were infected. There were probably seven generations of the disease at detention camp, covering a period of 73 days. As previously shown

there were only one or two secondary cases at main camp. On the ships the cases of March 2, 3, and 4 are secondary to the one February 21 and have for secondary cases those of March 16 and 18. At detention and on the ships the average period from rash to rash is 12 and 13 days, respectively.

A survey of the main camp taken during the progress of the epidemic showed 152 persons present never having had measles, or 18 per cent. There were a few second attacks among the 34 cases at main camp, and it is not practicable to estimate the percentage of susceptibles that succumbed. During this epidemic 3.2 per cent of the personnel of the entire station succumbed to this disease. During the previous winter there were 81 cases, or 4.1 per cent, and for the winter before 97 cases, or 5.9 per cent, of the personnel.

Prior to this epidemic of last winter it had been the practice to fight the spread of the disease not only by isolating the patient but also the "contacts" or bungalow mates, and terminal disinfection of bungalows was employed.

As to terminal disinfections, I can not see that they would be of any value whatever here. In consideration of these 65 cases I can not discover where one of them would have been prevented if a terminal disinfection had been made. It is true that on account of the method of housing here nature's supply of fresh air and sunlight is very little interfered with, but I can not escape the conviction that in general the terminal disinfection should be classed as an impressive ceremony instead of a means to prevent the spread of disease. In the case of contacts it is different; but evidently occupying the same bungalow does not by any means make a dangerous "contact." According to the experience here, a dangerous contact is one in which contamination is spread by an infectious individual by the droplet method, and other forms of contact are practically negligible. This method of transmitting disease is accomplished by talking, coughing, laughing, sneezing, or anything else which causes the air in the lungs to escape through the mouth or nose in an explosive manner and thereby carry infected droplets directly to the susceptible person.

Isolation is still practically the only means of controlling an epidemic of measles, and the earlier it is instituted the more efficient it will be. Several of our cases applied for treatment four days before the rash appeared, and in one instance it was five days.

These cases were probably infectious during all of this preeruptive period, and any system of isolation which does not take in the catarrhal stage as well as the eruptive stage will be far from efficient. Of course, any measures taken to prevent the assembling of persons where there is opportunity for infection by talking, coughing, laughing, and sneezing will have their prophylactic influence.

It would seem that a quarantine which prevented infection by the droplet method, as well as by the common drinking cup, would be efficient, and otherwise we can be liberal in permitting such patients to go about or be communicated with.

THE PRESENT STATUS OF THE HOSPITAL CORPS.

By W. E. EATON, Passed Assistant Surgeon, United States Navy.

By way of introduction let me say that the loyal cooperation of the individual medical officer with a view to encouraging, training, and retaining in the service those men who are of good quality, and the elimination by discharge or change to other more suitable ratings of those men who are evidently inapt and undesirable for the corps or the service, the decision in each case being arrived at by personal, unbiased observation under actual service conditions, is that duty which is greatest and most important in obtaining the highest efficiency of the Hospital Corps.

This efficiency and the character of the work turned out by the corps therefore rests entirely upon each medical officer. It is your effort in this particular that may save the service, your brother officer, or yourself embarrassment at some future date, should the very poorly qualified, inefficient hospital corpsman now under your observation be eliminated rather than passed on to someone else because he is too unsatisfactory in the performance of his duty to suit you. He will be just as unsatisfactory to the next officer.

The past year has been one of the greatest advancement of the Hospital Corps, not only in the training of the men, but also in increasing the general efficiency and number of men with the corps. The corps has increased almost 300 in number, and noticeably in the rating of hospital steward because of the imperative demand for the services of these highly trained men. On June 30, 1915, the total number in the corps was 1,584, divided up into 335 hospital stewards, 659 hospital apprentices, first class, and 590 hospital apprentices. While this is a larger number than has ever constituted the corps, it is 400 short of actual requirements, as 2,000 men are urgently needed to adequately meet demands.

There is now being developed a new Hospital Corps—new in that it is a corps of men trained from the very beginning of their service for their special duty.

Following the establishment of the training school for hospital corpsmen at Newport in the late spring of last year (1914) a definite comprehensive course of instruction was begun about June, and with ripening improvement is being followed out to the great satisfaction of all concerned.

In March, 1915, a school similar in aim and character and pursuing as nearly as possible the exact routine and course as outlined at Newport was established at the training station, San Francisco. So that there now exist in full, settled operation two schools, one on each coast, from which each month a few men who have completed the course are obtained for active duty.

The following methods are undertaken: Upon enlistment a hospital apprentice is transferred directly to either of the training stations at Newport or San Francisco. He remains about three weeks in the apprentice seaman brigade, where he receives instruction in general drills and Navy practices and the care of his clothing and belongings. He then goes to the Training School for the Hospital Corps for a six months' course of study of the duties of and general knowledge pertaining to the Medical Department, medicines, and care of the sick. The curriculum is one of about three months' duration in most subjects, and is therefore repeated, or the ground gone over twice by each man. From the school it is the intention to have the hospital apprentice go to a hospital (or the *Solace*), where it is endeavored to leave him for at least six months, in order that he may supplement his theoretical knowledge with practical bedside and ward experience. He is now sufficiently trained to adapt his knowledge of the conveniences for the care of the sick to the inconveniences on board ship, and can utilize such means as he finds there to a better advantage than heretofore. In addition he is more trustworthy, can be given greater responsibility, and his worth and aptitude for his duties have been established.

Since the fall of 1914 it has been the practice to follow out this general scheme. Almost all hospitals now have a number of men who have completed the training-school course and have been at the hospitals for several months, to the end that it will soon be possible to man ships with trained men, rather than the more or less green recruits, as heretofore. Several ships have already been so provided in whole or part. Medical officers on board ships may now be reasonably assured that within a few months the proficiency of the various hospital apprentices assigned to their department will be such as to give them a greater satisfaction than has ever been possible before, and will do away with the frequent complaints and requests for changes.

THE INAPT AND UNDESIRABLE.

The training schools have been a great factor in eliminating the inapt and undesirable. These are discovered within a few weeks, or at most three to four months, after their entering the school. Means are then taken either to discharge from the service or change

longer possible, owing to the irregularity of the activities and duties of these boats. Several new ships and several old ships have been put in commission, several new stations and several old stations opened; new recruiting offices are now and then opened—recently 10. At Philadelphia a selected organization is maintained with the marine regiments of the expeditionary forces' advance base.

All these new activities have created a demand which at times it has been extremely difficult to meet with the limited number of men available, and in order to make some provision at all stations it is frequently necessary to rob Peter to pay Paul. The need of an increased number of hospital corpsmen of all ratings is therefore greatly felt.

While a more or less definite complement of men has been specified for all hospitals, stations, and ships, it must be remembered that this number is one which the bureau hopes to attain and not one which officers in command are to demand or can hope to have, as is frequently the case. To meet all and often urgent demands and the exigencies of the service, it is frequently necessary to transfer men, particularly from the hospitals, which are the main sources of supply of trained men. When such transfers are made it is often not possible to avoid creating vacancies of which the bureau is aware, and it must be considered that, unless an emergency exists or arises, requests to fill the station to the exact complement specified can not be met. When transfers are recommended every effort is made to supply a relief in each case. These reliefs may not report for a day or so. This may be due to a delay at the man's previous station. The question of such delay is an important one. Frequently men are withheld for several days from the transfer directed and an official request submitted to retain the man named. Such requests are futile, as it must be remembered that the transfer was recommended for cause and to meet a demand, and that the longer the delay in transfer the longer the next station has to suffer the absence of the man and loss of assistance. This may apply in your own case, and it is therefore urged that, in order to facilitate transfers and give greater assistance all around, no delay be made and that men be started on their way as soon as expedient.

An effort has been constantly made since last fall to fill and maintain the complements of all stations as near that specified as possible. While the total number of hospital corpsmen has risen 170 more than last year, this number is not adequate to meet the needs of all ships and stations, and there should be at least 2,000 men provided for this work.

Much confusion has arisen among the men detailed to the vessels of the reserve fleets, due in part to the conflicting assignments, one

by the bureau and one by the commander-in-chief in question. An effort to avoid this confusion has been made in assigning men to the reserve fleet as a whole rather than to individual ships.

SEA DUTY.

Sea duty for hospital apprentices in their first enlistment is of about 18 months' duration, and for those in subsequent enlistments 2 years. Hospital stewards are expected to perform 2 years at sea and 2 on shore, alternately. Those men who are newly rated hospital stewards are first assigned to destroyers or small ships. If possible, another assignment to larger ships will be made during the second year of sea duty. The older stewards are as far as practicable assigned to duty on the hospital ship, the larger ships, or with expeditionary forces. On shore duty they are assigned to receiving ships ashore, the navy yard dispensary, barracks, Hospital Corps training schools, and independent duties, such as magazines. The younger hospital stewards are assigned on shore duty to the hospitals or to small stations where there is also an older steward to supervise their work.

RECRUITING DUTY.

Only those hospital apprentices, first class, who are serving in other than the first enlistment, and who have good conduct and efficiency reports, are considered for detail to recruiting duty. This duty is often independent of a medical officer, requires greatest attention to details, and demands only clean, reliable, well-qualified men. Men so assigned are expected to give the best service of which they are capable. The length of time for station at such duty is from 12 to 18 months, when a relief may be expected. No extension of this time can be allowed for any purpose.

ASSISTANTS TO DENTISTS.

With two or three exceptions the hospital stewards who have been doing dental work only have been discharged from the service and have not reenlisted. Such stewards will no longer be enlisted or reenlisted for dental duty only, but they can reenlist provided they are able and desire to take up the regular duties of a hospital steward, no special assignment being made. All work is now being done by the officers of the Dental Corps.

From time to time requests come in for a hospital apprentice to act as the assistant to the dentist. It is impracticable because of the lack of men to assign additional men to any ship or station in this

capacity. At some navy yards this has been attempted, and the following has been suggested in each case as the means wherewith to meet the needs of the dentist:

The bureau deems it not advisable to recommend hospital corpsmen for duty as assistants to dental officers only, but does recommend that the medical officer of the ship or station assign for a short period, in rotation, each of the hospital corpsmen attached to the medical department, who will render, in addition to his regular duties, such assistance as may be needed by the dental officer. In this way the greater advantage is gained, in that all apprentices will receive instruction in this line of work rather than that one man will neglect entirely the duties of a hospital apprentice.

TRANSFERS.

Transfers are made as nearly as possible on an even exchange between the stations concerned, and are made when a ship is in close proximity to the home port or other station from which the relief is to come.

Transfers over long distances are impracticable except at the expense of the applicant.

It is not desired nor practicable to specially detail men to any particular station in order that they may undertake independent courses of study. While there is no objection to men pursuing study courses, such courses must be undertaken outside of working hours and at such stations as the man is serving. It is not desired that hospital corpsmen be detailed to special duties by medical officers in order to enable such men to pursue courses of study. This has in several instances led to trouble and disappointment, if not unnecessary financial loss to the hospital corpsmen concerned.

The circular for the information of persons desiring to enlist in the Hospital Corps has been thoroughly revised and attention invited to the establishment of the two training schools and encouragement offered to all who desire to enlist or reenlist. Men who were eligible for promotion to hospital steward and whose enlistments were about to expire were written letters encouraging them to reenlist and stating their position on the eligible list and the expectation of their promotion. In this way several excellent men have been retained in service who would otherwise have been lost to a position in civil life with more pay than that of hospital apprentice, first class.

The need for ratings between that of hospital apprentice, first class, and hospital steward is becoming more and more imperative. Men who are excellent nurses but who have not the qualifications for hospital steward are discouraged by their failure to pass the examination for hospital steward, and yet are worthy of advancement and

pay beyond that of hospital apprentice, first class (third class petty officer). It is frequently a great question in the mind of the bureau in reviewing examination papers of those who desire the rating of hospital steward to disqualify men who show a greater knowledge than required for hospital apprentice, first class, but are still not sufficiently well informed to perform the duties and meet the questions arising in the rating of hospital steward. Deserving men are turned away, while others poorly qualified are, from the necessity of meeting the service needs, given the rating of hospital steward, and become unreliable and unsatisfactory. A very good hospital apprentice, first class, is lost and a very poor hospital steward gained. Great pains should be taken by all medical officers to see to it that only well-qualified and most desirable men are examined for this rating, as officers can much better judge of the personal merits of the case than the reviewer in the bureau; the latter can better judge of the mental qualities from comparison of all papers.

The most important thing in these examinations is the letter from the medical officer as to the qualifications of the man in question. This is the best means the bureau has in determining the candidate's aptitude. This letter is frequently omitted altogether, or is so brief as to be practically valueless. The single statement that the man is considered qualified is not enough, as it conveys no picture of the man's ability to act independently, etc.

On July 1, 1915, the permanent appointment was done away with in all ratings below that of chief petty officer. Hospital stewards, therefore, are the only members of the Hospital Corps entitled to permanent appointments.

The requirements for promotion to the rating of hospital steward, however, remain the same. A hospital apprentice, first class, whether enlisted in or promoted to the rating, is not considered eligible for examination for hospital steward until he has served not less than 24 months in the rating of hospital apprentice, first class. It is found that hospital apprentices, first class, enlisted as such and promoted to hospital steward after little more than a year in the service and corps, have not the qualifications nor experience to fit them for this most important duty, and on the whole these men have proved unsatisfactory.

RATING OF HOSPITAL STEWARDS.

Upon being found qualified, the candidate's name is placed on the list of those eligible for promotion in order of the date of his examination. When his services are required he is recommended for an acting appointment as hospital steward and assigned to sea duty.

DUTY.

When first appointed, hospital stewards are assigned to destroyers or other small ships, or are transferred to the Asiatic Station in the cases of men on the Pacific Coast. Men who are examined on the Asiatic Station and are found qualified by the bureau are usually soon nominated for appointment and to continue duty at their present station.

WHAT HAS BEEN DONE FOR THE CORPS.

1. The development of two training schools where new apprentices receive a course of instruction which fits them for the naval service and also for certain kinds of medical work in civilian life.
2. The elimination as far as possible of the unfit and inapt.
3. The placing within hospitals and on board ships of a better type of apprentice and a better trained apprentice.
4. Encouragement of reenlistments of hospital apprentices, first class, who have qualified for hospital steward, by writing them letters stating their position on the eligible list and their expectation for promotion; thus retaining many good men for the service.
5. Increased number of appointments as hospital steward.

WHAT HAS BEEN DONE FOR THE SERVICE.

1. All destroyers, whether in reserve or active service, are provided constantly with a hospital steward.
2. All small ships and ships in reserve are assigned one or more hospital corpsmen.
3. Many smaller ships have all hospital apprentices, first class, while the battleships are provided with three or four hospital apprentices, first class, as compared to one or two in the past, as more hospital apprentices, first class, are now available for sea duty.
4. All stations have practically full complements and the new stations are manned as nearly as possible with the number of men the station demands.
5. In addition to actual requirements of the Navy, the marine expeditionary forces are provided with full regimental and field hospital complements.

In the instance of every request for additional men temporarily, or for a permanent increase in complement, an effort has been made as far as possible to supply men, but this has not always been immediately possible because of a lack of available men.

To meet these great and constantly increasing demands a greater number of hospital corpsmen, independently of the ratio to the personnel of the Navy, must be had.

It is very remarkable to note that the increased need of the attendance of hospital corpsmen has created a demand from the service of such an imperative character that it can be little realized except at the detail desk of the bureau.

THE USE OF HOSPITAL SHIPS IN TIME OF WAR.

By R. J. STRAETEN, Passed Assistant Surgeon, United States Navy.

For reasons of financial economy and to utilize the work of the personnel of the Medical and Hospital Corps to the greatest extent, the separation of hospital ships into two classes in time of war would seem advisable. The uses to which these ships are put are twofold—the treatment of the sick and wounded up to or including convalescence, and the transportation home of those that are no longer able physically to take part in the conflict. In selecting ships for this duty the type of ship will have to be considered in placing it in the proper class, as most ships converted from the merchant marine can serve in no other capacity than for transportation.

The properly equipped hospital ship has been described by many medical men. It has been characterized as a modern hospital afloat, and all agree unanimously that nothing should be omitted in its equipment that is found in the most up-to-date hospital ashore. To best meet these requirements it should be especially constructed for this purpose. To bring these modern appliances of medical science to the most strategic position among the fighting ships we must go a step further—its speed and steaming radius must equal that of the ships of the line.

Ships employed for the transportation of the wounded need not be so completely fitted nor possess the speed of hospital ships proper. In classing them apart let us designate these vessels used for transportation purposes as hospital transports. They may be easily converted from any well-ventilated merchant vessel. The cost of this, as well as their upkeep, would be small compared to the well-fitted hospital ships, and by doing this subsidiary work would enable the hospital ships to remain where their services are of greatest value. In case the scene of action is located at a great distance from the American coast vessels bringing supplies to the fleet may be used, in addition to the regular transports, to carry convalescent wounded on their return trip to the United States.

The Geneva Convention designated a distinguishing color for hospital ships, and as far as possible hospital transports should be so painted, and the other articles complied with; in this instance, however, they can be used for no other purpose than medical. In the

recent landing at the Dardanelles the number of wounded among the allied forces was so great as to overwhelm the capacity of the hospital ships, and the transports used to convey the troops thither were used to transport the wounded to their base at Alexandria, a Red Cross flag being flown at the foremast.

The status of the transports when used in this way, without going through the formalities as laid down in the Geneva Convention in regard to hospital ships, renders them liable to capture by the enemy, but if captured they are entitled to all the rights of a merchant vessel, and proper provision must be made for passengers and crew, as required by international law, before the vessel is destroyed.

To bring out more clearly how ships of this class are to serve their purpose in time of war let us assume conditions that may arise in an engagement near our coast. It will be impossible to give but very brief mention to the main events and to what would appear to be the most reasonable course for the hospital ship to take. The fleet will be gathered at the most strategic point. Our scouts will be out gathering as much information as possible about the movements and strength of the enemy. On this information our own movements depend. His forces will assuredly be superior to ours, but in spite of his superiority in number of ships and guns there are many important factors in our favor. During this time the hospital ship should be with the main body to relieve them of any sick or otherwise disabled. If such are only temporary they should be retained; otherwise sent home via a transport upon the approach of battle. The hospital ship should keep the dressings on all ships to the expected need, and replace medical officers and hospital corpsmen that may be incapacitated.

There should be daily instruction held on board for the Medical Reserve Corps officers and Hospital Corps; and if they can be spared, the medical officers of the fleet should also be ordered to participate.

When the time has come to accept battle, the hospital ship can do no better than to remain within easy communication with the fleet, but outside the range of hostile scouts and destroyers. If she ventures too far, she might find herself the innocent bystander in the midst of gunfire. Her assistance is practically negligible until the outcome of the engagement is decided. Even in case of victory her operations will depend upon the amount of damage suffered by our ships, since the military requirements will be paramount to humanitarian.

If our forces be victorious, there will be a vigorous pursuit of the enemy. Some of our ships will undoubtedly have suffered to such an extent as to render them unfit for further participation; they will have fallen out of line, or perhaps sunk. Of these crippled, those

remaining afloat may be harassed by hostile destroyers. Until these are dispersed the hospital ship must remain at a distance.

As soon as the seas are cleared of the last remnant of the enemy's forces the hospital ship can be employed in picking up the men in the water. Perhaps by this time the slower moving hospital transports may have arrived on the scene and the work of picking up the drowning may be left to them, and the hospital ship may turn to render aid to the wounded on the crippled vessels. If they are so damaged as to be rendered helpless, unable to make port without being towed, the wounded should be removed to the hospital ship; but if they can proceed under their own power to the nearest port, military necessity will demand that they lose no time in reaching port. The safety of the vessel itself may be at stake and the ship lost; and, again, any unreasonable delay in getting the ship underway and to port for repairs to enable her to rejoin the line as quickly as possible will be time wasted. Transferring wounded at sea will naturally require considerable time. It is exceptional to have a sea smooth enough to do this with reasonable comfort to the wounded, many of whom would require far more gentle handling than they could receive under the most favorable conditions of weather, and unless handled gently this transfer would be a detriment to them instead of a help. Those not so severely injured could be made comfortable temporarily. To meet all conditions most expeditiously medical officers and nurses in sufficient numbers, with dressings, are put on board from the hospital ship and both ships can proceed on their respective missions unhindered.

The scouts can be handled similarly if at hand, but the needs of the main body should not be neglected, and as long as they are in need of attention the hospital ship should not go too far out of her course to render assistance to the wounded on a scout cruiser, unless such procedure is deemed urgent and her service can be spared for the time being. The same applies to rendering aid to the ships of the enemy. It should be done if not too much time is taken up thereby, but the duties of the hospital ship to our ships must be kept in mind.

The vessels able to assist in pursuit of the enemy, having completed their mission as far as lies within their power, and ready to return, will be encumbered with wounded, and on account of the structural damage sustained must proceed immediately to a port for repairs to enable them to take part in battle as soon as possible. This structural damage is a great hindrance to the proper care of the wounded and delay in their transfer might appear inhuman, but under the most disheartening conditions means can be found with fresh medical assistance at hand to render temporary aid and allevi-

ate the suffering of the wounded until hospital facilities are more readily available.

If the hospital ship has not tarried too long with the ships that were crippled earlier in the engagement, she will be well on her way to give aid to these returning ships. It is therefore obvious that attention given any one vessel beyond what is actually necessary is done at the expense of the others. Little at best can be done for the wounded at this time, but what assistance is rendered should be as impartial as possible. In this instance again no further aid can be given than to place doctors and nurses on board the fighting ships. When they arrive in port as many as possible should tie up to the dock to make the transfer of the wounded easier, and any work on the ship interfering with this should be postponed. The boats of the hospital ship should be placed at the disposal of these vessels anchored, and any cases from these requiring urgent attention can more quickly be handled on board the hospital ship.

In case of defeat, the drowning of the sunken ships will be picked up by the enemy and be prisoners of war; the wounded also will be given attention by them. The vessels remaining afloat will seek protection of the nearest ports. It may be that in some of these ports hospital facilities are inadequate or lacking. If this possibility is foreseen, there will not be sufficient time available to make up for the shortcoming, and the only timely remedy is to send the hospital ship there at full speed. It is under conditions where an action takes place away from good hospitals ashore, when they must rely on what little there is, that the need of the hospital ship is greatest, to be used in temporarily taking the place of these or reinforcing them if their capacity is insufficient.

But it is not always that actions so favorable to the wounded as this are fought. When operations are carried on among our insular dependencies or perhaps along foreign shores, where hospitals for the fleet exist only as hospital ships, or as a base equipped solely from the hospital ship, that the need of these vessels is proved indispensable. Long after a base has been established the only resource for proper attention of the seriously sick and wounded will be the hospital ship. Such an expedition would probably be accompanied by troops if the fleet of the enemy can be held in check or previously destroyed. Close cooperation should exist between the medical departments of both services and our hospital ships placed at their disposal until they are well established ashore.

Any methods established for the care of their wounded afloat should remain under control of naval medical officers, and the fitting out of vessels to be used as hospital transports should be done under the supervision of the Medical Corps of the Navy, with naval medical officers, or Reserve Corps, serving on board.

But until they are well established, the hospital ship being better equipped, would have to be depended upon. More satisfactory results may be expected from surgical work done on board, the temporary quarters established ashore being used for ordinary medical cases and convalescents.

In case of a military expedition of considerable size being sent to occupy territory, the transportation home of invalids becomes an important item and must be arranged for. The vessels carrying the soldiers might be converted into suitable hospital transports at the base, if the conveyances at hand proved insufficient, the doctors, nurses, and medical outfit being supplied by the hospital ships.

The uses for which vessels of this class are designated have been very briefly stated in the foregoing lines, and if correct it is reasonable to assume that unless all ships of this class are fitted with modern equipment and to the same degree of completeness, their classification into two separate classes seems obligatory. To use a vessel possessing all the requirements of an up-to-date hospital ship for transportation purposes is a waste of material; if a vessel converted into a hospital ship, whose equipment could not properly be used for anything further than transportation, be assigned to perform the duties of a hospital ship, the wounded would suffer neglect. Such a situation might easily occur, when, in spite of their varying degrees of fitness, one ship is considered as good as another and they are used indiscriminately, regardless of their limitations. It is quite possible that the best equipped hospital ship would be on a voyage home with ineffectives when a big battle is in progress, and the care of the men in this action would fall to the ships unfit to render efficient service to the same degree. In conclusion, let us give a short résumé of the qualities a vessel of each class should possess to fulfill the foregoing duties at the minimum of cost to personnel and material.

The hospital ship should be large enough to accommodate comfortably at least 600 patients, and in case of necessity this number may be increased to 1,000 without undue crowding. There should be three well-equipped operating rooms located on the upper decks. In addition a dressing room large enough to handle several cases at a time should be on each of the other decks.

Also, rooms where sterile dressings can be prepared on a large scale; autopsy room with cold-storage fittings, X-ray room, a laboratory to meet all conditions, and examining rooms for the several specialties. These compartments and the wards should be airtight and permit of ready fumigation. Isolation wards should be located in the after and out-of-the-way section of the ship. The galley should be able to render the same service as at a hospital.

It is obvious that the material for surgical dressings should be large in amount, as this is not only for her own use, but to replenish the stock of the fighting ships, and to establish emergency hospitals on shore. She should carry sufficient anesthetics, disinfectants, and surgical instruments and appliances to serve all needs.

Since she is expected to furnish doctors and nurses for the ships of the line and to outfit hospital transports when required, a large number of these should be available, in addition to her regular complement. They may well consist of medical officers of the Reserve Corps.

Her speed and steaming radius should be sufficient to enable her to maintain position with the fighting ships. To lessen the amount of space required for fuel and do away with the inconveniences attendant upon coaling ship, she should be an oil-burner.

Inclined planes should run from deck to deck for the easy and rapid handling of patients, or instead of this a roomy elevator, all to be at some central point; and all wards, or as many as possible, should have direct communication with this compartment. A door opening through the ship's side, on both port and starboard sides, should be constructed, through which patients can be admitted without being carried up the gangway. These doors should be directly opposite the central distribution point.

The hospital transport should conform to all the regulations of international law as applied to hospital ships. Her speed and capacity are of no consequence. In selecting ships for this duty good sea boats, with plenty of ventilation, should be given preference. If time and space permit, there should be inclined planes installed from deck to deck. A dressing room with several tables should be fitted as centrally as possible on each deck; also an operating room, X-ray room, and a small laboratory; but they need not be fitted as completely as on the hospital ships.

The dressings need not be excessive. Her complement should consist of one medical officer of the Navy and two Reserve Corps officers. The staff of dressers should be large, being in proportion to the number of patients carried and the attention that they might demand.

In times of peace a list of ships suitable for this purpose can be kept and the plans for changes required in each case kept on file, to be put in effect when it is expected their services may be required. How many of these ships may be needed depends upon the character of the military operations.

In times of peace one hospital ship should be available for service with the fleet at all times, and as these ships require repairs and overhauling from time to time two of these ships should be on the Navy list, and in time of war, if well handled, their number may not have to be increased in so far as the needs of the Navy are concerned.

VENEREAL DISEASE ABOARD SHIP.

By G. F. COTTLE, Passed Assistant Surgeon, United States Navy.

Ever since the early days of medicine the complications and sequelæ of venereal disease have presented to the profession one of its greatest problems and have brought to the human race an enormous amount of illness and of crippling, both physical and mental. Until very recent years, except for the interest of a few genito-urinary specialists, the prevention, care, and management of these diseases in their early stages has been neglected or left to quacks and druggists, or treated inefficiently or insufficiently by the general practitioner or by the patient himself. During the last few years an accumulation of evidence and a clearing of knowledge has brought the profession sharply to the conclusion that the prevention and care of these diseases in their earlier stages is of the first importance. So terrible are the damages to innocent children and innocent women from the sequelæ of partially cured or neglected venereal disease that the so-called social evil is meeting with a very great amount of attention. Facts brought to light by the medical profession have not only forced the problem into the minds of medical men but have also occasioned moralists, teachers, hygienists, preachers, literary men, social workers, mothers, and fathers to search for a solution. From the dark obscurity of ignorance and the fog of prudery and false modesty the dangers of venereal disease have emerged, and only by more knowledge and more effort can the human race lessen their evil effects.

The profession of medicine year by year has studied individual cases and has advanced a long way toward a proper and successful management. A few sufferers seek treatment and have the persistence, self-control, and economic independence to continue treatment till that difficult goal—a cure—is reached. A considerable number afflicted with these diseases either fail to reach that goal or during the tedious progress toward it add to the sum total of the disease in the community by infecting others with their own disease through ignorance, carelessness, viciousness, or weakness. No one believes to-day that the mass of venereal disease in a community can be lessened or its effects made less damaging by caring only for those who voluntarily present themselves for treatment. Already some States have passed laws which require the reporting of venereal disease; some cities have increased their facilities for the treatment of acute venereal diseases in clinic or hospital ward; Wassermann tests are beginning to be done free of cost by many State and city boards of health; school boards are trying to find proper ways of teaching sex hygiene; social workers are attempting to lessen prostitution; well-meaning but mistaken reformers have passed laws

requiring a medical examination before marriage and overenthusiastic ministers have refused to marry couples unless they presented a clean bill of health. Extremes of enthusiasm occasionally lead to meddlesome interference with human rights, but they soon demonstrate their own futility and are abandoned. Other enthusiasms bring to the front measures that have a lasting value. These signs of the times are healthy; they spell progress; they mean that the problem is in the limelight, that upon it thinking people are focusing their attention, and that sooner or later a solution will be found.

The actual amount of progress toward lessening the incidence of venereal diseases has been small, the amount by which the crippling effects of their sequelæ has been diminished is great. The talking, writing, discussing, and experimenting of the last decade has brought big results, but much better results are needed before we can rest. The problem of venereal disease is well named the social problem, for its solution must engage the active cooperation of every subdivision and every stratum of the community, and it must enlist the cooperation of every individual in the community. Venereal diseases and their effects can not be legislated, moralized, or lectured out of existence. By education, prophylaxis notification, control of those afflicted, and efficient and sufficient treatment their incidence can be lessened, the economic damage of their early acute stages can be markedly reduced, and the terribly crippling effects of their many complications and sequelæ can be reduced to a disappearing minimum.

The sufferer from venereal disease often has reasons which make him desirous of hiding the fact from everyone, often even from his physician. He is not sick in bed. He mingles with other people in his home, at his work, and during his time of recreation. He carries no visible outward sign by which he can be recognized. The prostitute or woman of easy virtue does not know she is giving disease to many men, or, knowing, does not care, for she must earn her livelihood. The treatment of venereal disease is often tedious; it requires the expenditure of money and time on the part of the patient and requires of him a degree of patience, a desire to get well, and an active cooperation with the physician that is seldom found, or, if found, seldom lasts until a cure is reached. These conditions and many others make the practical application of preventive and curative measures so difficult in any community that one at first feels hopeless in the presence of the problem. He who attempts to treat venereal disease in the aggregate—that is, the sanitarian or hygienist who aims at a lessening of damage in the community as a whole—must face a very difficult problem, for any educative, legislative, or prophylactic measures he may attempt can not be easily

guided by positive results because of the elusive character and habits of the sufferers whose infectivity he seeks to control.

On board a naval vessel there is an opportunity to study intensively the effect of community management of venereal disease. Many of the complexities of civil communities are removed. Often for longer or shorter periods all contact with other communities is cut off by days of seagoing. Here can be learned the incidence of venereal disease, the results of educative and prophylactic measures, here can be studied the lives and habits of men, those who have contracted disease can be controlled and effectually treated. Does such a community throw any light on the problem of the social evil? Can careful observation in the Navy bring to light important facts? For some years naval medical officers have actively advocated the use of prophylactic measures; they have long advocated and actively participated in the education of men in the dangers of these diseases. The naval regulations give complete control over the actions and liberty of men known to have venereal disease, and they give the right to examine men for disease and allow the infliction of severe punishment upon individual concealment of disease. Have these measures caused the disappearance of venereal disease; have they lessened its sequelæ; have they reduced the economic damage; should they be continued, modified, or given up; are they in whole or in part applicable to civil life?

In medical magazines just now estimates of the incidence of venereal disease in the civil community are continually being made. Figures are gathered from private practice, clinics, hospital wards, insane asylums, reformatories, institutions for the blind, epileptic farms, and prisons. These figures allow all sorts of interpretations and give rise to a variety of conclusions. One conclusion to be found in an article recently published represents the average general conclusion. Here it is said that "one-half of the male population of civilized countries has had or now has gonorrhea, and that probably more than one-tenth has had either acquired or congenital syphilis." Most of the estimates place the statistics from the Army and Navy very conspicuously and frequently accompany these statistics with a few words a bit derogatory to these services. The Army and Navy have long been leaders in the notification of venereal disease, and it is believed that their figures indicate accuracy of observation and honesty of statement rather than a degree of depravity in the services to which they apply.

It is possible that the incidence of venereal disease in the Navy may be slightly higher than it is in the civil community as a whole. There are certainly many reasons why a higher incidence should be expected. Below the grade of chief petty officer the men of the Navy

are young, most of them unmarried, nearer 20 than 30 years of age; they are past the period of youthful idealism and bashfulness which protects extreme youth; they are separated from home, from the influence of sisters, sweethearts, wives, or mother; their periods of shore liberty are necessarily brief; their normal need for the companionship of woman is whetted by long periods of absolute separation. Once ashore the one open, well-blazed and well-lighted path leads to the saloon and to the brothel. In these two places the sailor quickly finds the companionship, the spirit of fun which he normally craves. Here he finds music, laughter, dancing, and gayety. Well fed, full of life, spirits, and robust health, with money in his pocket and with youth spurring him on, is it to be wondered at that he frequently fails to avoid the pitfalls of the only places where he is always sure of a hearty welcome?

A great many measures are carried out by the naval officers and others to counteract the temptations that normally beset the life of the sailorman. In our training stations the medical officer talks to the recruit about the dangers of venereal disease and sends him to sea well enlightened. At navy yards and shore stations, Y. M. C. A.'s and other philanthropic organizations attempt to compete with the dangerous attractions of the port. On board ship the medical officers continue to instruct the crew at frequent intervals. Division officers and others in command do all they can to stimulate athletics, to increase facilities for proper recreation and call attention to the opportunities for advancement in rating. Still when all these means are summed up they must necessarily be insufficient to entirely counteract the peculiar conditions of a seafaring life. They do their share by teaching a healthy fear of real dangers, by encouraging manliness, decency, and desire to get ahead, but they do not remove man's normal instincts nor do they suddenly change ordinary human beings with ordinary self-control into extraordinary beings with perfect self-control. During a cruise in European waters lasting 11 months the writer has had an opportunity to study the habits of the men aboard his ship and to record the incidence of venereal disease and its effect on the efficiency of the crew. During the period there have been but few changes in the personnel of the ship. Below the grade of chief petty officer there were 560 men who remained continuously on the ship during the cruise, and the figures that follow are taken from a study of these men.

At the beginning of the cruise a careful inspection of the crew brought to light the number of cases of active venereal disease on board, a survey of the medical records gave the number of men who had venereal diseases before the cruise began; during the cruise inspection of the crew from time to time prevented the concealment of

disease. In the figures which follow chancroid has not been considered, because this condition begins and ends with the individual infected. It has not, therefore, the importance in a given community that attaches to gonorrhea and syphilis, with their far-reaching consequences.

	Gonorrhea.	Syphills.
Medical history of previous attacks.....	102	34
At beginning of cruise, under treatment.....	34	.....
During cruise, 11 months, primary admissions.....	79	17
Total incidence in 560 men.....	215	51
Percentage incidence.....per cent..	38	9

Men infected with syphilis tend to reenlist in the service because, among other reasons, they are sure of continued treatment without cost. This fact helps to keep up the number of syphilitics in the Navy. On the other hand, recruiting eliminates the congenital syphilitic.

Compared with the above quoted average incidence for the civil male population, these figures give a lower level for venereal disease in that part of the Navy here studied than is estimated for the civil community as a whole.

During the cruise the use of venereal prophylaxis was, of course, taught and encouraged; a clean, well-lighted space was equipped and placed in charge of a hospital apprentice, and the men were here supplied immediately on their return from liberty. The records kept in this room show that during the 11 months of the cruise 94 shore liberties were given, and among the 560 men under consideration 516 took prophylactic treatment 4,895 times, thereby admitting at least that number of exposures to venereal disease, while 44 by not applying for the preventive treatment thereby denied exposure. That some of the 44 who did not take the preventive exposed themselves at some time during the 11 months is certain, because 3 of this number contracted gonorrhea. Certainly the amount of fear and the amount of knowledge imparted by medical officers and through other sources did not succeed in preventing these men from exposing themselves to infection, for 92 per cent admitted exposure and some of the remaining 8 per cent contracted disease.

The number of primary admissions among these 560 men during the 11 months was gonorrhea 79 and syphilis 17. A study of these cases has shown that by far the great majority were acquired after shore liberty in the one port where 48-hour liberty and overnight liberty was granted. The histories of the majority of these cases read over and over again, "Prophylactic taken 10, 18, or 20 hours after exposure." There were 18 overnight liberties and 92 afternoon

liberties, and yet the great majority of primary admissions followed the few long liberties where prophylactic was given late. Figures are not of much value, but the opinion of the writer, based on a study of the cases summed up in these figures, agrees emphatically with the dictum so often enunciated by all who advocate prophylactic treatment, namely, "Prophylactic measures against gonorrhea and syphilis in order to be most effective must be used early, certainly not later than two hours." Failures of prophylactic treatment are due to the element of time and not to the measures themselves. The failures show the need for a prophylactic packet to be used immediately after exposure, in addition to the treatment aboard ship, if we are to further lessen the incidence of these diseases in the Navy.

During the cruise there was no opportunity to send venereal cases to hospital. This gave an excellent opportunity to study the amount of damage as measured by sick days. The records show:

Disease.	Cases.	Sick days.
Gonorrhea:		
Fever.....	1	4
Severe posterior symptoms.....	1	8
Epididymitis.....	7	41
Joints.....	1	46
Uncomplicated.....	103	0
Total.....	113	99
Syphilis.....	17	155

It is believed that frequent inspections of the crew, to insure early treatment and absolute restriction to the ship during the period of treatment, kept the sick-day damage from gonorrhea and its complications at a low level. The small amount of damage from syphilis is due to the fact that salvarsan-mercury was used on board ship as soon as the diagnosis was made. Two of these cases, one a hospital apprentice, the other a mess attendant, had 85 of these sick days, because their occupations demanded this long separation from duty, while the other 15 cases had only 70 sick days, or an average of less than 5 sick days each. In a former article¹ it was said that syphilis damage in sick days could be reduced to an average of 6 sick days per case. These 15 cases seem to illustrate the advantage of administering salvarsan on shipboard whenever possible.

In conclusion it may be said that talks to men by the medical officers probably have but little effect in keeping men away from exposure to venereal disease. They should, however, be given, for at least they prevent men from drifting into trouble through ignorance. Prophylactic treatment on board ship, if given shortly after exposure to venereal disease, is a remarkably successful preventive

¹ Cottle, G. F. The Damage of Syphilis to the Navy. U. S. Naval Medical Bulletin, ix, No. 3.

measure. Prophylactic treatment packets for use ashore would probably help to further lessen the incidence of venereal disease. Frequent inspections of a crew prevent concealment, insure early treatment, and thereby lessen sick-day damage. The general use of salvarsan on board ship will cause sick-day damage from syphilis to practically disappear from Navy statistics. These measures, aggressively used, will increase naval efficiency by reduction of sick-day damage and bring the management of venereal disease in line with present-day methods and knowledge. If civil communities could study the habits and diseases of their young men as minutely as is possible in the Navy, they might find in Army and Navy statistics a parallel to their own.

SOME DANGERS IN PASSING THE URETERAL CATHETER TO THE KIDNEY.

— By B. C. WILLIS, Assistant Surgeon, Medical Reserve Corps, United States Navy.

In the recent literature there have been reported a number of collargol fatalities and others giving serious symptoms following pyelography. From two of the cases reported it seemed quite evident that the ureteral catheters had been passed into the substance of the kidneys and the collargol injected at that point. To support these views I have carried out some experiments upon dogs' kidneys with the view to ascertaining whether or not the ureteral catheter could be passed into the substance of the kidney, and if so, which type of catheter penetrates most easily. The ureteral catheter with the tapering end, rounded tip, and eye quarter of an inch back (catheter No. 1) was found to be exceedingly easy to pass into the substance of the kidney. The rounded tip with eye at one side (catheter No. 2) was found to be the next easiest. My method in doing this is to open the abdominal cavity, find the ureters, nick them, introduce the catheter, and pass it up. It was difficult to tell just when the substance of the kidney had been penetrated, and it was not known until the hand was passed up and the catheter tip found against the posterior capsule. Collargol was injected in case 2 and a roentgenogram made (fig. 1). The distribution of the collargol in the two kidneys is very different, as was to be expected, owing to the different types of catheters. In the kidney penetrated by catheter No. 1 the collargol was deposited in the substance and escaped back into the pelvis, whereas in the case of No. 2 the collargol was driven beneath the capsule separating it from the cortical portion of the kidney.

In the human kidney there is greater depth of substance, and doubtless on this account there would be more infiltration of the

substance of the human kidney than of the dog's, and the collargol would not so easily return to the pelvis with catheter No. 1.

The cystoscopist must bear in mind that there is no definite length of ureters in any given case, and likewise they may differ in the individual. Therefore catheters that are marked for a given distance are exceedingly dangerous if passed to that length in all cases, for in so doing the point of the catheter may be carried into the substance of the kidney and the collargol injection made there. The danger of entering kidney substance is increased if the catheter fits the carrier at all tightly, for it dampens the sense of resistance given by the tip coming in contact with the kidney structure.

It is also dangerous to have a preconceived idea as to the amount the pelvis of the kidney may hold, for it has been my experience that the pelvis may contain no more than 1 cubic centimeter, and to inject a larger quantity in such a case would invite disaster.

It is best not to carry the catheter more than 4 to 6 inches in any ureter, except under extraordinary circumstances, and then the least resistance experienced in passing same should be sufficient cause to desist. In a recent case I was very greatly surprised by the occurrence of an unusual complication. I was using a No. 5 bismuth catheter which had been kept in solution while getting ready for examination, thereby rendering it more pliable. It was readily introduced into the left ureter. This patient had been previously X-rayed for stone, as she gave a history of typical attacks, but none were found. These attacks, however, were so typical that the roentgenologist desired to further confirm his plates by having the catheter passed to the pelvis; this was done, and on passing what was thought to be the normal length of ureter, and finding no obstruction, 6 cubic centimeters of 10 per cent collargol were injected into the catheter without causing any discomfort to the patient. On beginning to withdraw the catheter some difficulty was experienced, and finally after about 10 inches were withdrawn the catheter hung for some unaccountable reason. At this time I surmised that a stone had been displaced and impinged on the catheter, or that a spasm of the ureteral meatus had caused prolapsus of the ureter. The cystoscope having been removed was reintroduced and the bladder found to be normal. Gentle traction was made on the catheter under vision and the ureteral meatus was brought into urethra without patient experiencing any pain, but the catheter would not loosen, and fearing prolapsus, traction was discontinued. The patient was X-rayed again and both plates were developed at once, which clearly explained the trouble—a doubling back of the catheter upon itself, thereby causing a loop which was brought down to the bladder portion of the ureter and there hung. The catheter was

Willis—Dangers of Ureteral Catheterization.

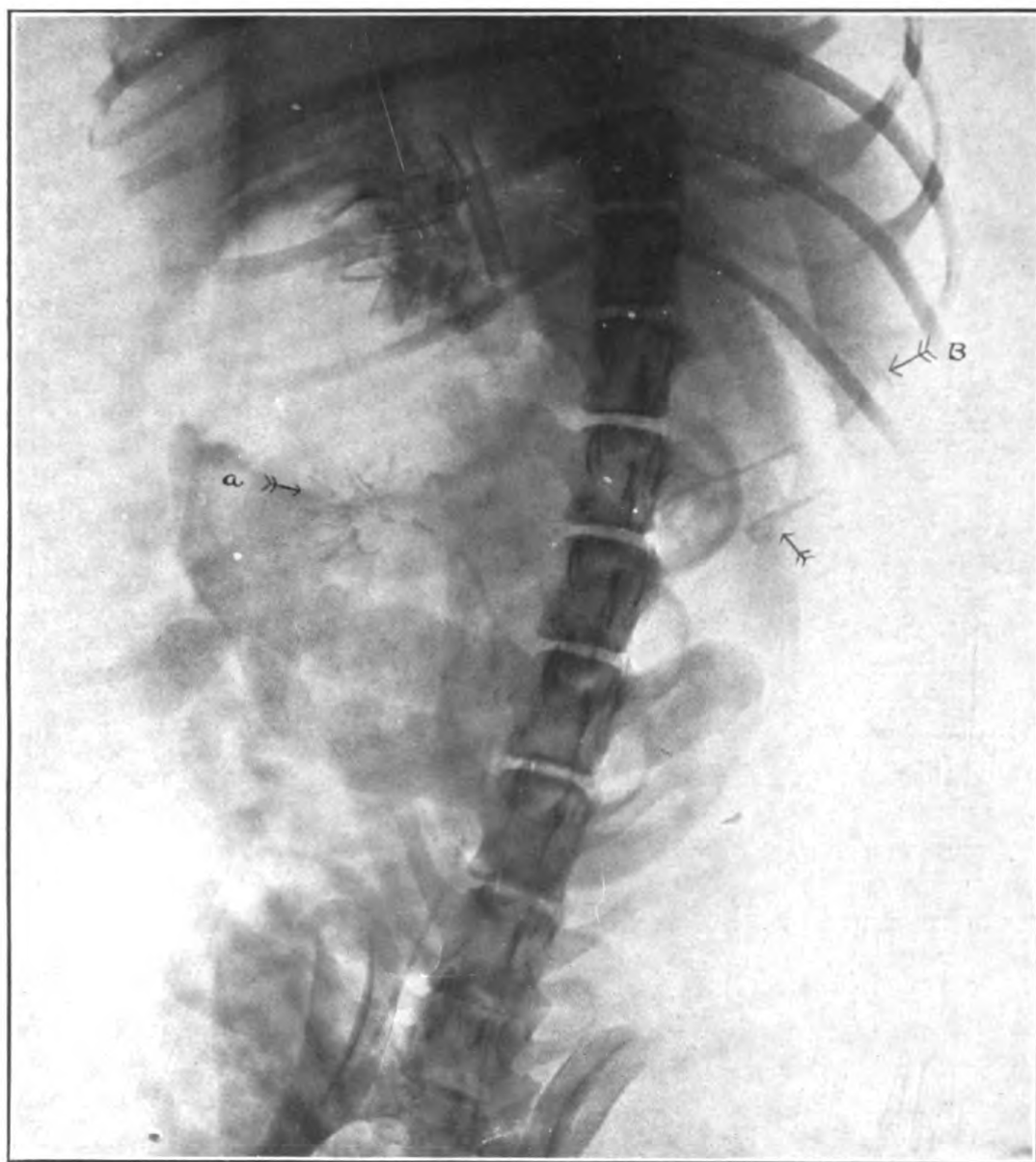


Fig. 1.—*a*.—Arrow at tip of catheter No. 1 against posterior capsule, also shows general distribution of collargol. *B*.—Thin shadow of collargol between capsule and cortex of kidney. Catheter No. 2.

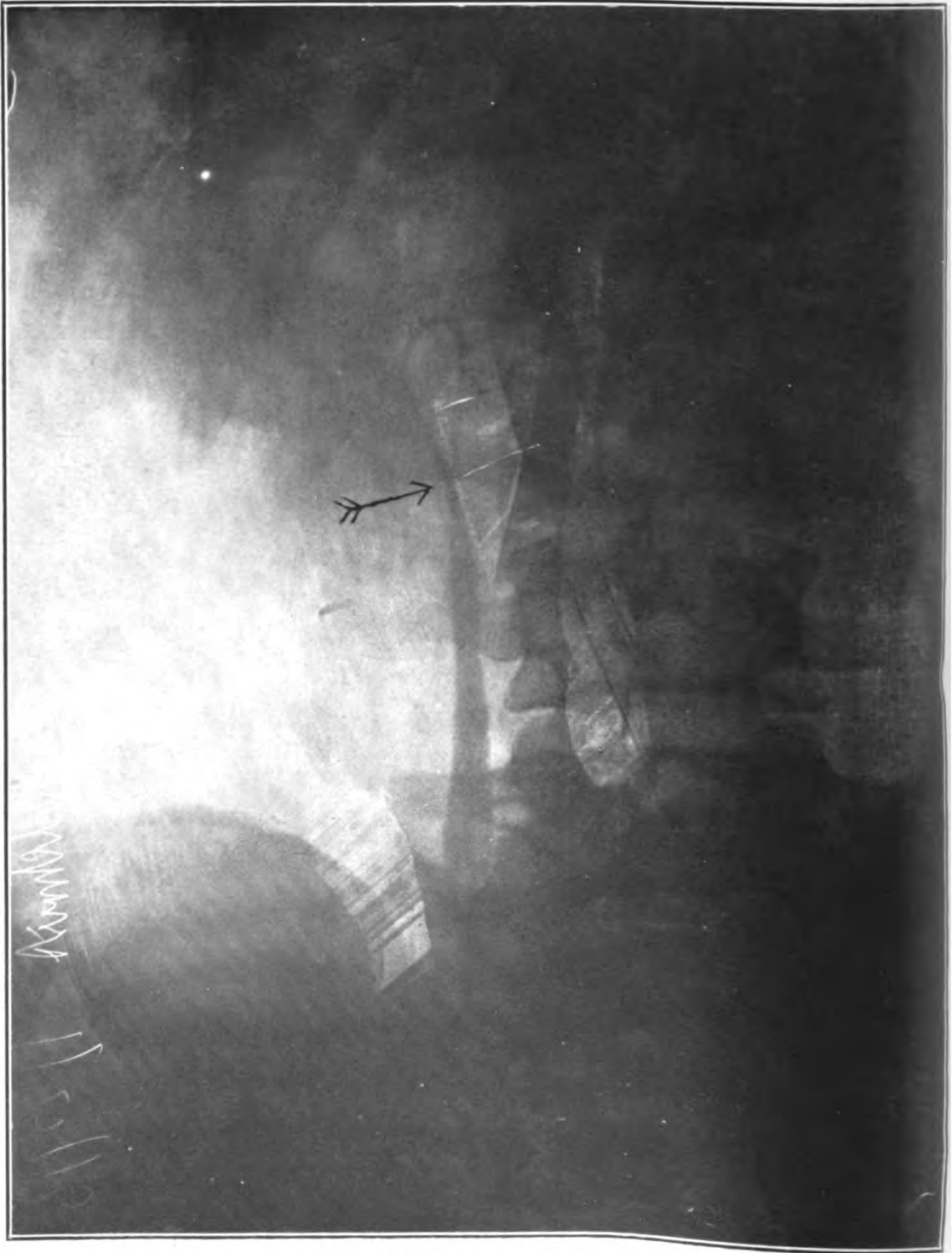


Fig. 2.—Catheter tip reentering ureter; loop in pelvis.

allowed to remain for 36 hours, the urine being withdrawn by syringe to prevent hydronephrosis, at the end of which time traction was made on catheter and same was readily removed (fig. 2).

PROTOCOLS.

Dog No. 1, medium size mongrel. This dog had just been killed after some pharmacological experiments. Body temperature nearly normal. Abdomen opened, ureters found, nicked, catheter No. 1 introduced into left ureter, passed up until blocked. Catheter No. 2 passed in same manner on right side. Median incision carried higher and hand passed to kidneys in search of catheter tips; both were found just beneath the capsule in posterior half of kidneys and nearer caudal pole. Collargol was not injected.

Dog No. 2, medium size mongrel. This dog had been used as No. 1, though still alive and anesthetized. Abdomen opened, ureters nicked, and the catheters passed the same as in No. 1. At this stage 2 cubic centimeters of 10 per cent collargol were injected into each catheter; abdominal incision extended and catheter tips found against posterior part of capsule. Dog was brought to X-ray room and roentgenogram was made. (Dog was killed after experiment was completed).

Dog No. 3. Under ether anesthesia was treated in the same manner as the two previous. In this case a different type of catheter was used instead of No. 2. This catheter tip was much more blunt, and in passing the hand to the kidney the tip was not felt nor was collargol seen. Catheter No. 1 was again found against the capsule. Roentgenogram was not made in this case.

CONCLUSIONS.

1. It is possible to penetrate the substance of a dog's kidney with the ureteral catheter.
2. Ureteral catheters are made more flexible by standing in solutions, thereby increasing the chances of turning backward in the kidney pelvis.
3. It is safer not to pass ureteral catheter to the kidney pelvis.

SHANGHAI AND YANGTZE RIVER HOSPITALS.¹

By R. H. LANING, Passed Assistant Surgeon, United States Navy.

Views expressed by naval officers who are either doing gunboat duty on the Yangtze River or by those who have completed a tour of duty on the same are various, but the generally prevailing senti-

¹ Received for publication Dec. 4, 1914.

ment seems to be that, although the duty is enjoyable, they object to it, in many instances, on the ground that they retrograde professionally. This objection does not necessarily apply to the naval surgeons—not for a period of one year, at any rate. Here is an immense tract of land in the center of China with a teeming population, who have been suffering for centuries with a majority of the known diseases of man—some diseases which are never encountered elsewhere by naval surgeons.

On the shores patrolled by the Yangtze squadron are some 35 hospitals, run for the most part by American and British doctors, where the naval surgeon is always welcome and where he can go in his odd moments and learn much about various diseases and how best to do with the minimum advantages. Moreover, scattered along the river are physicians of a very high grade, acquaintance with whom is not only pleasant but highly profitable professionally. With the help of reports kindly furnished by the medical officers of the various institutions, it is proposed to give a brief survey of these hospitals in the ports from time to time visited by ships doing duty on the Yangtze River. It very often happens that naval medical officers come to the river and stay for some time without availing themselves of the advantages coming from acquaintance with civil medical authorities ashore and their institutions, causing them to think the Yangtze River duty both unprofitable and boresome. It was thought that perhaps a brief survey of the hospital situation in this part of the world would be of some advantage to those medical officers about to be ordered out to this particular duty.

The civil hospitals on the shores of the Yangtze and its affluents, from the point of view of the naval surgeon, may be divided into three great classes, viz: Those for foreigners, those for natives, and those for both natives and foreigners. Besides these, there are several Japanese hospitals maintained by and for their own nationality in Shanghai and Hankow. The hospitals maintained for Chinese are of interest mainly from an educational standpoint; i. e., here there is limitless material for the study of Chinese diseases. As practically all of these are under foreign supervision—American or British—in case of necessity arrangements could be made for admitting foreigners, and in isolated parts this is often done. In the hospitals for both Chinese and foreigners the two classes of patients are kept entirely separate.

Shanghai, the great trading center of the Far East, is far richer in hospitals, clinics, and dispensaries than is appreciated by the ordinary medical man. Some of these clinics and dispensaries are located in parts of the town difficult to find for the first time; but, once found, they are well worth the effort. In Shanghai the hospitals maintained for foreigners only are the Victoria Nursing Home

and the Shanghai General Hospital. Those coming under the head of hospitals for both Chinese and foreigners are the Harvard Medical School Hospital, the Shanghai-Nanking Railway Hospital, the Hôpital Ste. Marie, and the Municipal Isolation Hospital. The hospitals for Chinese only are the Shantung Road Hospital, St. Luke's Hospital for Chinese, the so-called West Gate Hospital for Chinese women, St. Elizabeth's Hospital, the Paulun Hospital, and a few small ones run by local Chinese practitioners. There are several hospitals run by and for Japanese alone.

The Victoria Nursing Home or Institute (figs. 1 and 2) was opened in 1901 and was founded in the year 1897 in commemoration of Queen Victoria's Jubilee by the foreign community of Shanghai. It is supported by the municipal council and from the fees of private patients. The institution is located on the corner of Range and Hannen Roads. The grounds surrounding the hospital are spacious and well kept. It is made up of several separate buildings; the main one is situated in the center of the grounds facing the corner made by the intersection of Range and Hannen Roads. It is about 10 or 15 minutes' ride in a rickshaw from the Bund, off which our ships usually anchor.

All the blocks making up the hospital are built of brick; the main building is the general hospital, with four stories. On the first floor are the executive offices, the kitchen, the nurses' dining room, the drawing room, etc. All stories are connected by stairs and an elevator. The operating room is on the second floor; its floor is of concrete, the light is good, and it possesses a fair supply of instruments, which is being added to from time to time. On this floor is also located the diet kitchen.

In the general hospital there are 18 first-class and 15 second-class beds, the latter for sailors, policemen, and lower grade employees of Jardine & Matheson's, and Butterfield & Swire's Steam Navigation Companies. The second-class beds are located in two wards on the second floor. The principal thing lacking in the hospital equipment is an X-ray machine.

The so-called mental ward is a brick two-story block with men on the first floor and the women on the second. Both floors are identical in construction; there is a well-aired and sunny veranda extending the length of the building on either floor and opening onto each veranda are six rooms, including a strong room. The latter are especially well fitted with strong, glazed, heavy canvas over padding on all the walls and floor. This ward is under the charge of a strong-minded but pleasant Scotch nurse who looks as though she would be able to handle any situation that might arise. Facilities for hydrotherapy are most needed to make the equipment complete.

The maternity ward is a brick two-story block with eight beds. There are five large single rooms and a delivery room with all modern equipment for the treatment of mother and child. This is the only real maternity hospital in the Far East. The remaining building is a hospital for Indian and Chinese policemen and has accommodation for 30 patients. Transportation within the hospital is done by means of stretchers and ward carriages. The food is excellent and the cooking is under the direct supervision of graduate nurses. The kitchen is remarkably clean, well screened, and equipped. There is one cook with four assistants under the charge of a graduate nurse. The thing that strikes one the most about the whole institution is its absolute cleanliness and cheerfulness. The toilets are the ordinary box-toilets of China; the buildings are electrically lighted and the water is supplied by the Shanghai water works from the Whangpoo River.

The head of the nursing staff is the matron, Miss Summerskill, a very capable and pleasant English woman, who has practically the whole institution on her shoulders. Under her are ten foreign graduate and six pupil nurses. In various parts of the hospital there are Chinese orderlies to help the nurses.

The medical staff consists of any local practitioner or naval surgeon that brings patients to the hospital. There are no internes or house physicians. When naval patients are taken to this hospital they have to be cared for by naval surgeons, and in case no United States vessels are left in port, arrangements must be made with some local practitioner for the care of the sick. The British Navy appoints some local medical man to look after things in just such circumstances, and pays him a retaining salary of a certain sum per annum.

The usual charges for cases in the Victoria Nursing Home are:

Individual cases:

First-class single rooms, 6 taels daily.

First-class double rooms, 4 taels daily.

Second class in wards, 2 taels daily.

Special first-class rooms, 8 taels daily.

Special nurse, if requested, extra, 4 taels daily.

Use of operating room:

First-class major operation, 20 taels.

First-class minor operation, 10 taels.

Second-class major operation, 10 taels.

Second-class minor operation, 5 taels.

Use of ambulance, \$3 Mexican.

Maternity cases:

First class, upper floor, south aspect, 8 taels daily.

First class, lower floor, south aspect, 5 taels daily.

First class, upper floor, north aspect, 5 taels daily.

Second class, 3 taels daily.

Special nurse, if requested, extra, 4 taels daily.

Outside the Home:

For the entire services of nurse, 4 taels daily.

For maternity cases, 5 taels daily.

Duty visits not exceeding one hour (not made to cases of infectious diseases), 1 tael daily.

On the recommendation of the attending doctor the fees may be reduced in special instances or the cases considered charity. Last year there were treated approximately 530 patients, 186 of whom were surgical and 76 of whom were nursed outside the hospital by the nursing staff. Cases needing isolation are not taken in here, but must be sent to the sister institution—the Municipal Isolation Hospital.

The Shanghai General Hospital (figs. 4 and 5) was founded in 1864 as a small hospital of 30 beds by a board of trustees selected from among the foreign community, mainly for the purpose of caring for stranded, indigent, sick, seamen. A trust deed was made in 1878. The institution continued to grow as time went on until now it is a 140-bed institution. It is a general hospital, as the name implies, taking any but isolation cases, which must be sent to the Municipal Isolation Hospital. Heretofore the hospital has been self-supporting, but owing to the recent improvements made, and owing to the large number of charity cases taken in, it has assumed some debts for which the international and French municipalities are liable. The governing body of the hospital is a board of governors consisting of three members of the consular body, namely—the consul general of France, consul general of Germany, and the consul general of Great Britain; two representatives from the French municipality, and four representatives from the international municipality.

The hospital is located on Soochow Creek not more than five minutes' walk from the Bund and facing the street with a car line. The buildings are of varied architecture on account of additions that have been made from time to time. There is the old building in the shape of a U, facing the street. One arm of the U is occupied by women, the other by men, and the central portion is occupied by the Sisters. This is a two-story structure and is quite old and worn. At right angles to one arm of the U-shaped building are two newer structures, one behind the other. The one in front is a wooden two-story house, the one to the rear a five-story building of brick. This latter is the main hospital building and has a double elevator. All these different structures are connected by closed passages. The hospital possesses two adequate operating rooms, a post-mortem room, and two kitchens, one for the patients and one for Chinese attendants and coolies. It also has a good X-ray machine with which Dr. McCloud, who is in charge, does excellent work in

roentgenography. The institution has a horse ambulance, and transportation within the hospital is done by ward carriages and stretchers. The toilet facilities are such as are found throughout China, viz, the box-toilet. Here as in practically all the Shanghai hospitals, most of the disinfecting is done by the municipal health department. The hospital is heated by steam and lighted by electricity.

The nursing staff consists of 30 sisters of the Order of the Franciscan Missionaries of Mary. From the foundation of the hospital up to a year ago the Sisters of Charity, St. Vincent de Paul, had charge, but owing to the fact that the order is primarily for the care of indigent and poor, and also owing to the fact that they were unable to meet the growing demands of the hospital in regard to the number of sisters, they were supplanted by the present order, which is primarily for large hospitals. Besides the sisters, there are four Japanese dressers in the operating rooms and numerous Chinese coolie attendants.

The regular medical staff consists of four resident Shanghai practitioners. Any doctor having residence in Shanghai can treat his cases in this hospital by making application on a prepared blank form to the board of governors, who will pass him if a licensee in his own country. Naval surgeons are not allowed to treat their own cases in this hospital. There are two wards into which the naval sick are admitted, and they are here attended by Dr. Billingshurst, free of charge, except for the hospital fees. Officers are considered first-class patients and enlisted men as third-class patients.

The charges are as follows:

First class, 6 taels daily.

Second class, 3 taels daily.

Third class, \$2 Mexican daily.

Operating room:

First class, 20 taels.

Second class, 10 taels.

Dressings:

First class, \$1 Mexican.

Second class, \$0.75 Mexican.

Third class, \$0.50 Mexican.

Last year 1,615 patients were admitted, of which 1,273 were men and 342 women.

The Red Cross Society of China in 1907 erected a brick hospital building at No. 7 Siccawei Road, about $3\frac{1}{2}$ miles from the Bund, and called it the General Hospital of the Red Cross Society of China. It is a large two-story building, with nine wards and private rooms for first and second-class patients. In May, 1913, when the Harvard Medical School of China started its work, they made an agreement with the Red Cross Society to run the hospital in exchange for the free use of the building and grounds, inasmuch as the Red Cross

Society did not have the funds to run it themselves. Since then the institution has been known as the Harvard Medical School Hospital (figs. 6 and 7), although, properly speaking, it is the General Hospital of the Red Cross Society of China, operated by the Harvard Medical School of China. The amount received from patients only pays part of the running expenses, the rest being furnished by the corporation of the above school. The hospital is located in the most healthful and quietest part of Shanghai. It possesses a large, well-kept lawn. It is soon to have a motor ambulance, which will make it about 15 minutes distant from the Bund and in easy reach of the ships.

Since the Harvard people have taken the hospital the wards on the first floor have been transformed into classrooms and laboratories. They have an excellent X-ray machine with dark room, etc., on the first floor, with which they are doing very good work. The top floor is purely for hospital purposes; on it is a beautifully equipped operating suite, the best in Shanghai, consisting of three rooms, besides a sterilizing room, all having cement floors and smooth, tiled walls. The operating suite is very well lighted by the skylight above and the windows on the sides. It is provided with clusters of electric lights for night work. The whole hospital is equipped with electricity, gas, and hot and cold water, and plenty of ice is to be had. There are three first-class rooms on the second floor, and five second-class rooms; the former differ from the latter in that they are provided with verandas. There are two toilets for the three first-class rooms, with porcelain baths, hot and cold water, and porcelain toilet boxes. The floors throughout the hospital are varnished with Ningpo varnish, rewaxed several times a day and kept spotlessly clean. The first-class rooms are large enough to accommodate four or five patients in a pinch. Of the second-class rooms one is large enough to accommodate six people without crowding, the others three. The fee charged for first-class rooms is 6 taels, regardless of the number in them, and the enlisted personnel will be accommodated in the second-class rooms in the hospital at the rate of \$3 (Mexican) a day. All the rooms in the hospital are equipped with the latest model of Lawson-Tate beds, and hair mattresses made in Shanghai. There is an excellent pathological laboratory on the first floor under the charge of a good American pathologist. The X-ray room has a well-equipped Snooks apparatus with appurtenances. The system of keeping clinical records of patients is very thorough.

In addition to the main building with the laboratories and hospital there is another two-story, smaller brick building fitted up as a third-class hospital for Chinese. This is used as a teaching hospital for the school. The charges here are \$0.20 (Mexican) a day per bed. The first floor is for men and the second for women, and both floors

together have a capacity of 40 beds. This building, as is the other, is kept scrupulously clean, and like it the floors are covered with Ningpo varnish and waxed several times a day. It has as good accommodation as any so-called first-class bed for natives in Shanghai. No dangerous communicable disease is taken in. The hospital is equipped with two kitchens, one for Chinese the other for foreigners, both of which are very clean and well screened. The dining room is also screened.

The nursing staff consists of three American graduate and registered nurses, and under them white and Eurasian pupil nurses, who are high-school graduates and who are given practical and theoretical instruction for three years corresponding to that in the first-class hospitals in the United States. At present there are five of these pupil nurses.

The medical and surgical staff of this institution is as follows: Acting superintendent, Carl A. Hedblom. Nurse committee, Carl A. Hedblom, Henry S. Houghton, A. M. Dunlap. Business manager, Herbert P. Shaw. Visiting staff: Department of medicine, Han Thue, Stafford M. Coxe, Henry S. Houghton; department of surgery, Carl H. Hedblom; department of eye, ear, nose, and throat, A. M. Dunlap; pathologist, Harold E. Eggers.

The history of the clinical staff is as follows:

Carl A. Hedblom, A. B., A. M., Colorado College; M. D., Harvard; house officer, Massachusetts General Hospital; assistant, Free Hospital for Women, Brookline, Mass.

Han Thue, Gymnasia, Christiania, Norway! M. D., Christiania; medical assistant, Government Veterinary Laboratory, Christiania, 1896-1901; first assistant, Hygienic Institute (University Christiania), 1901-1903; Pasteur Institute (bacteriology), 1903-1904; first assistant (and acting professor of medicine), Government Hospital, Christiania, 1904-1907; practice and teaching, Shanghai, 1907-1914.

Stafford M. Coxe, A. B., M. B., M. D., Trinity College, Dublin; L. R. C. S., L. R. C. P. (Ireland).

Henry S. Houghton, Ph. B., Ohio State University; M. D., Johns Hopkins; assistant, Rockefeller Institute for Medical Research; physician and customs surgeon, Wuhu, China; dean, Harvard Medical School of China.

Albert M. Dunlap, A. B., University of Illinois; M. D., Harvard; Massachusetts General Hospital.

Harold E. Eggers, B. S., M. A., University of Wisconsin; M. D., Rush Medical College; house officer, Cook County Hospital; fellow in pathology, University of Chicago; research staff (pathology) Memorial Institute for Infectious Diseases.

The authorities of the Harvard Medical School Hospital will be more than glad to have the United States Navy send their sick to their

institution. The only drawback that now exists is the distance of the hospital from the ships, and now this drawback is about to be turned into an advantage by the acquisition of a motor ambulance, in that it removes the patient from the more unfavorable surroundings of the down-town hospitals. The American man-of-warsman would get better medical attention than in any other hospital and would have the advantage of the personal interest shown him by patriotic American citizens. Naval surgeons would be allowed to treat their own cases in this hospital, when they so desire, and then could turn them over to the local authorities when leaving port. There will be no difficulty in their getting to the institution. There has been opened an out-patient clinic in connection with the establishment on the corner of Peking and Chekiang Roads, and when the motor ambulance arrives it will go back and forth many times daily, by which the naval doctor could go and return. Moreover, there are two graduate doctors living in the same compound as the hospital and in easy call in case of necessity, which is more than can be said of other Shanghai hospitals. Besides the above advantages, there is the added one to the naval medical officer of coming in touch with brainy, pleasant men, a large collection of medical periodicals, a very well equipped laboratory, and a native clinic.

The Shanghai-Nanking Railway and District Hospital (fig. 8) was established by this corporation in 1908 for the treatment of their employees, but it being found that the space and facilities were more than that needed for their own people the hospital was opened to the general public. The institution is supported by the Shanghai-Nanking Railway Company and the fees of nonrailroad patients. It is situated at 132 Range Road, between 10 and 15 minutes' ride in a rickshaw from the Bund, on the outskirts of the foreign settlement, and only a short distance from the Shanghai-Nanking Railway station. The hospital consists of one main four-story building and a small one in the rear used as a dispensary for the lower class railway employees. Transportation of patients to and from the hospital can be done by the municipal horse ambulance, a railroad hand ambulance, or by carriage. The building, with the exception of the operating room, which is heated by steam, is warmed by open fires or stoves. It is lighted by electricity, and possesses no elevator. There are two wards, one for Chinese and one—the so-called naval ward—for foreigners. The two wards are absolutely separated. The naval ward has six beds and the Chinese ward ten. There are twelve private rooms, six containing two beds and six with one bed. All the floors are of varnished wood except the operating room, which is floored with some special form of cement. Transportation of patients within the hospital is done by means of carriages or stretchers. The operating

room is on the third floor and is well lighted on two sides. The nurses live on the top floor. Disinfection here, as in most other Shanghai hospitals, is done by the municipal health department. Isolation cases are not admitted. There is a small room for minor laboratory work. The hospital possesses a very good X-ray outfit and the services of a German-trained roentgenologist. It might be said that the hospital is really built around the X-ray laboratory. The charges for its use are the same as the Shanghai General Hospital. There are two kitchens—one for foreigners and one for Chinese. None of these Shanghai hospitals seem to have adequate protection against fire. In all of them the disposal of garbage and sewage is the same, i. e., it is carried away and either dumped or sold. American and British naval sick are quite frequently sent here. The charges are \$6 Mexican for officers and \$3 Mexican for men, exclusive of doctors' fees.

The nursing staff consists of a matron and three nurses, all four trained in England; two male dressers—one a Hindu and the other a Chinaman—both trained in the hospital itself. The medical staff consists of two British doctors—Dr. Ziervogel, a Boer, and Dr. Patrick, a Scotchman—and one Chinese doctor. Any reputable local physician, as well as naval medical officer, is allowed to treat his cases in this hospital. Before leaving port naval surgeons must make arrangements as to fees, etc., with some local practitioner who is to look after their cases.

This hospital is very close to the Victoria Nursing Home, so that if desired a case could be treated in the latter, and for any radiographic work needed the patient could be referred to the Shanghai-Nanking Railway Hospital.

Situated way out in the French settlement, about $2\frac{1}{2}$ miles from the Bund, is the Hôpital Ste. Marie (fig. 3). This institution was built by the French Jesuit Fathers about six years ago for the Chinese, primarily, but, finding the surroundings and air so excellent, many foreigners have started to come here for treatment. This hospital possesses five two-story brick buildings, one for women, one for poor Chinese, one for Chinese prisoners, one for second-class Chinese, and one for Catholic missionary fathers and foreigners. The grounds are very spacious and beautiful; scattered here and there are clumps of shrubbery and trees, small palms, and summer houses. The drawback to these beautiful grounds is the immense number of mosquitoes with which the place is infested. The institution is self-supporting. It possesses a horse ambulance and is only a block or so distant from a street car line. The hospital has about 250 beds. There are 20 first-class beds for men, 12 for women; 50 second-class for men and women; and at least 100 third-class, besides fourth-class beds. There are no elevators and patients are transported in this hospital by

Laning—Yangtze River Hospitals.



Fig. 1.—Victoria Nursing Home, Shanghai.

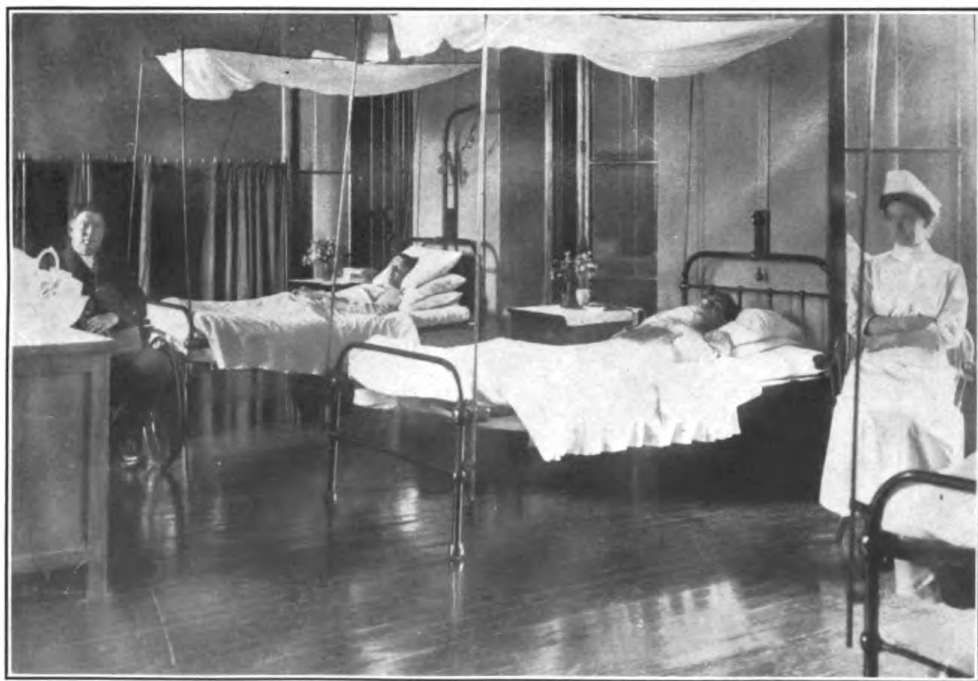


Fig. 2.—Victoria Nursing Home, Shanghai. Sailors' ward.

Laning—Yangtze River Hospitals.

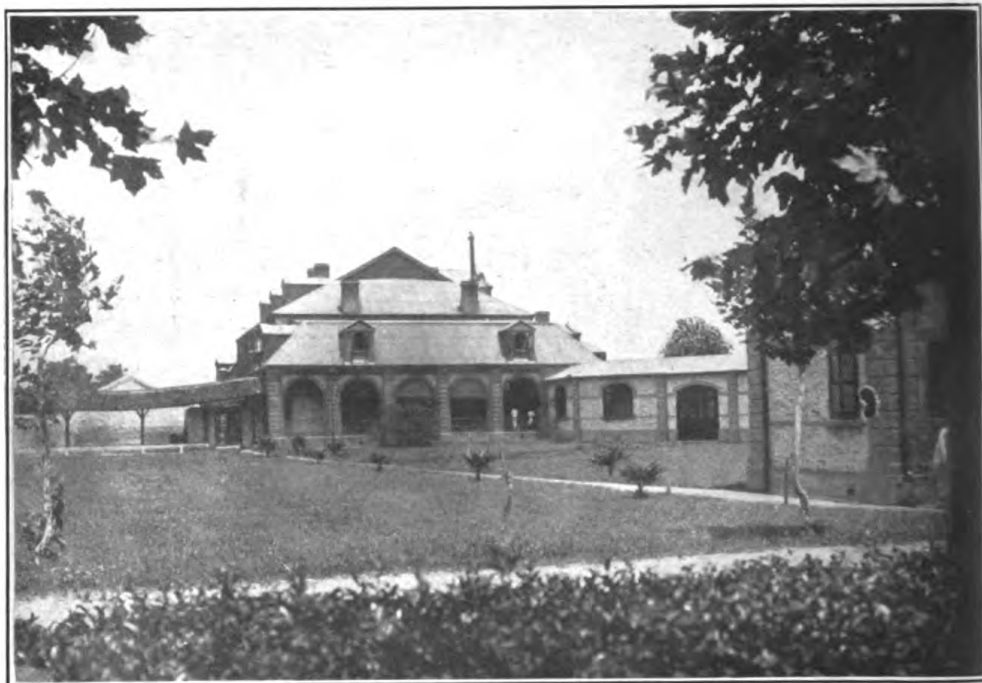


Fig. 3.—Hôpital Ste. Marie, Shanghai.



Fig. 4.—Shanghai General Hospital.

Laning—Yangtze River Hospitals.



Fig. 5.—Shanghai General Hospital. Third-class ward.

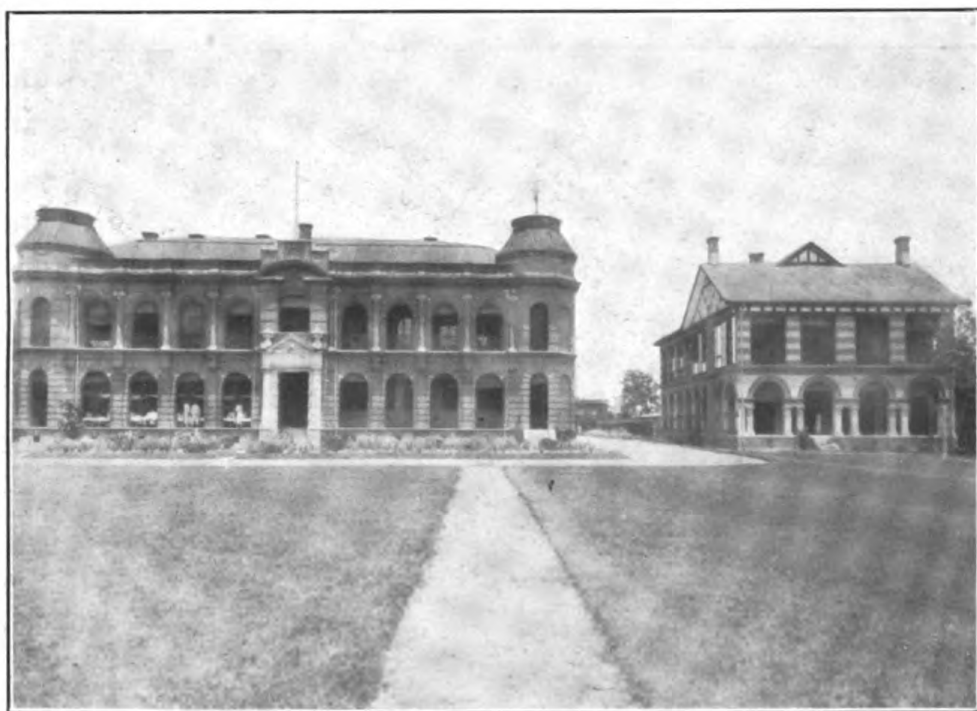


Fig. 6.—Harvard Medical School and Hospital, Shanghai.

Laning—Yangtze River Hospitals.

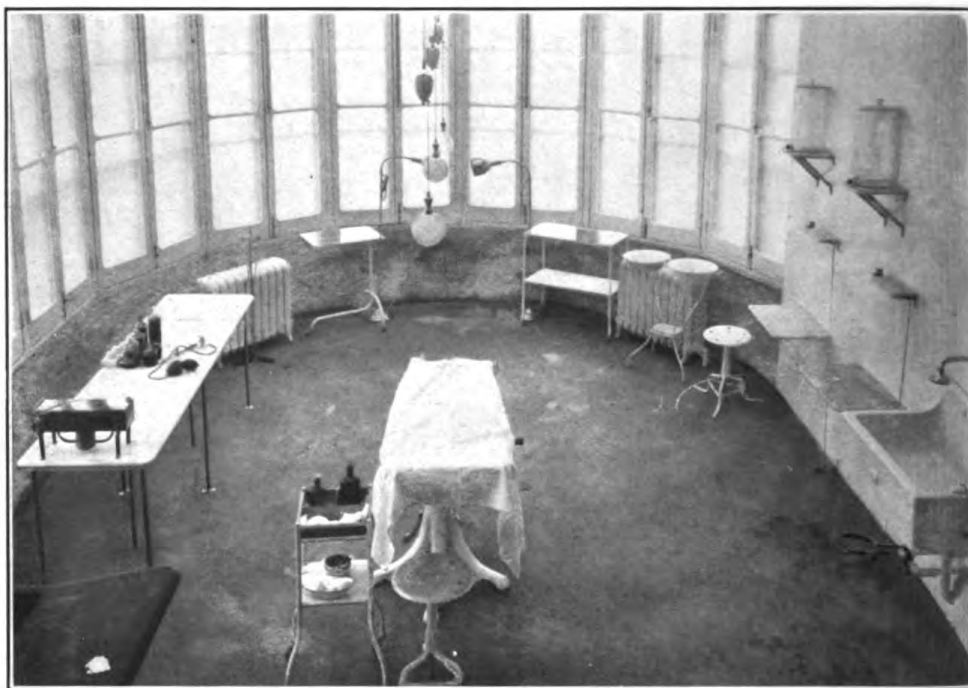


Fig. 7.—Harvard Medical School Hospital, Shanghai. Operating room.



Fig. 8.—Shanghai-Nanking Railway Hospital.

Laning—Yangtze River Hospitals.

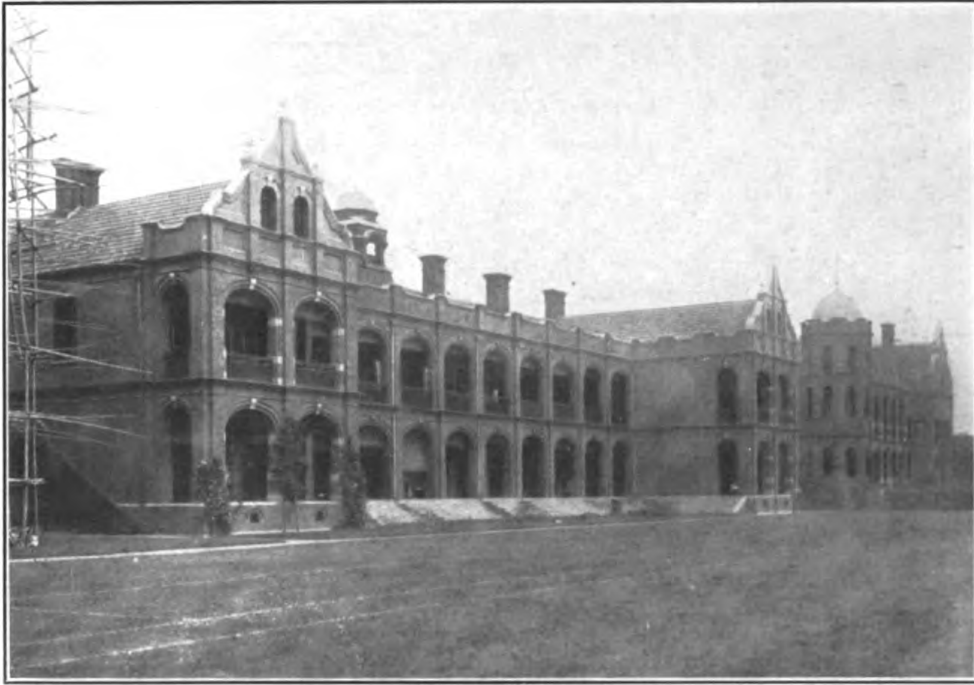


Fig. 9.—Municipal Isolation Hospital, Shanghai.



Fig. 10.—Margaret Williamson Hospital, Shanghai. General view.

Laning—Yangtze River Hospitals.



Fig. 11.—Margaret Williamson Hospital, Shanghai. Operating pavilion.



Fig. 12.—St. Elizabeth's Hospital, Shanghai. General view of exterior.

stretchers and chairs. There is one operating suite, consisting of one room for dirty and one for clean cases, and a sterilizing room. The suite is well lighted and equipped. There is a small laboratory for minor work, but no X-ray outfit. The hospital has two kitchens, one for foreigners and one for Chinese. Disinfection of rooms, etc., is managed by the French health department. The toilets are the box variety and sewage and garbage disposed of in the usual Chinese manner. The hospital has the city water supply and raises all its own vegetables, employing a dozen or more gardeners in its extensive gardens, which produce two crops yearly.

The nursing staff consists of 12 members of the Order of the Sisters of Charity, St. Vincent de Paul. These sisters took charge here after being displaced at the Shanghai General Hospital by the Franciscan Missionaries of Mary. They had been so long at the latter institution that when they left they were followed to their new domicile by many of the residents of Shanghai in times of sickness, to whom they had endeared themselves by their never-tiring care, patience, and devotion. All the sisters are French except two, of whom one is Irish, the other Italian. All the sick French sailors and soldiers are treated in this hospital.

The medical staff consists of two French doctors—Dr. Fresson and Dr. Pellet—both of whom speak English perfectly. No other doctors are allowed to treat cases in this hospital.

The charges of pay cases are as follows:

First class, \$6 Mexican.

Second class, \$4 Mexican.

Third class, \$2 Mexican.

Fourth class, practically charity.

United States naval personnel would be gladly welcomed at this hospital, as the sisters have a warm spot in their hearts for those with whom they became so well acquainted when in charge of the Shanghai General Hospital. The charges would be \$6 (Mexican) for officers and \$2 (Mexican) for men. The cases, however, could not be treated by naval medical officers. No dangerous isolation cases are admitted to this institution.

The Municipal Isolation Hospital (fig. 9) is located on Range Road, only a short distance from the Victoria Nursing Home, and is a sister institution to it in that both are under the control of the municipal council of Shanghai. It consists of two distinct parts, that for foreigners and that for Chinese; both under the municipal health officer, but having different matrons and nursing staffs. The institution was opened in 1904 by the municipality of Shanghai. The foreign portion of the hospital is built of brick in two and three stories and in two blocks. It has a capacity of 50 beds, with both first and second-class accommodations combined. Between the foreign part of the

hospital and the Chinese part are extensive lawns, used by the nurses and patients to play tennis, hockey, etc. The fees charged are 6 taels daily for first-class beds and 2 taels for second-class beds. The hospital was built primarily for the care of diphtheria, scarlet fever, and smallpox cases, and in the summer time cholera. In special cases arrangements can be made with the superintendent to take cases of measles and chicken-pox, especially from aboard ship. The floors are kept well polished and the whole place is very neat and tidy. All the necessary aseptic and antiseptic precautions against spreading of infectious disease within the institution are thoroughly enforced. Besides the regular hospital, in the same grounds, are the public disinfecting station and morgue, which are made use of by almost all the Shanghai hospitals.

The nursing staff of the foreign portion of the hospital consists of the superintendent and about five English and one Japanese nurse. Any physician may bring his cases to this hospital. The municipal ambulance may be used for transporting cases.

The Chinese half of the hospital is for native cases, living within the confines of the foreign settlement. Those living outside are taken to the Chinese Public Isolation Hospital. These two institutions, together with the Chinese Cholera Hospital, are the only ones in Shanghai where contagious cases are treated. This part of the isolation hospital is a long two-story building, considerably older than the foreign portion, and is built of brick and plaster. It has 150 beds in 19 wards. One finds here not only cases such as are admitted to the foreign portion of the institution, but many cases of beriberi. The nursing is done by the matron, Miss Murphy, and a number of Chinese female nurses under her.

Adjoining the foreign portion of the hospital is the residence of Dr. Davis, one of the municipal health officers, who looks out for those cases of contagious disease not having a doctor of their own. Within the same compound also is the Lock Hospital, where the inmates of the municipally-inspected brothels are examined and treated.

We come next to a brief survey of hospitals in Shanghai where Chinese alone are treated. These are of interest to naval medical officers mainly for observing and studying the diseases of Chinese. Four of them are under the auspices of foreign missionary societies and two under a Chinese corporation. The missionary hospitals are St. Luke's Hospital for Chinese, the Margaret Williamson Hospital, the St. Elizabeth's Hospital, and the Shantung Hospital for Chinese. The institutions under a Chinese corporation are the Chinese Public Isolation Hospital and the Chinese Cholera Hospital.

The St. Luke's Hospital for Chinese was founded in 1866 by E. H. Thompson of the American Church Mission. It is situated at the

intersection of Seward, Boone, and Nanzing Roads, about five minutes' walk from the Bund. The institution is supported partly by the mission and partly by subscriptions of foreigners and Chinese and the fees from patients. It is located at one edge of the international settlement, and the Shantung Road Hospital for Chinese is at the other edge, so that between them they do almost all the accident work occurring amongst the Chinese in Shanghai. St. Luke's is situated in a crowded district, so that there is no open ground or lawn to speak of around it. It has three buildings which are quite old, so that the hospital does not look as attractive as some of the more recently built ones. The buildings, however, are kept clean and sanitary. They are four-storied structures and contain six public wards and 15 private rooms with 140 beds in all. The hospital possesses a well-equipped operating room with an amphitheater, as well as an X-ray machine. Fifteen cents Mexican is the charge for ward patients, and for private patients \$2 to \$4 Mexican per day. Last year 1,400 patients were treated within the hospital and 80,000 were treated in the out-patient clinic. The hospital is used for teaching purposes by St. John's Medical School.

The nursing staff consists of three foreign graduate nurses, with Chinese boys as assistants. The medical staff consists of two American doctors, A. W. Tucker, M. D., University of Virginia, and H. H. Morris, University of Pennsylvania, besides four Chinese doctors, who are graduates of St. John's Medical School in Shanghai. These doctors are very courteous and glad to have naval surgeons come to the hospital either to see the cases or to help them with the work.

The Shantung Road Hospital for Chinese, as the name indicates, is situated on Shantung Road, about 15 minutes' ride in rickshaw from the Bund. It was started by Dr. Lockhart of the London missionary board some 60 years ago. About 40 years ago the control of the hospital was handed over to the foreign community of Shanghai. Eight years ago the London mission was asked to take over the medical control of the institution, so that now the property and the financial end of the institution are in the hands of a committee of local authorities, both Chinese and foreign, while the medical control is in the hands of the London Missionary Society. There are two wooden four-story buildings, one for men and the other for women, besides a small block for pay male patients.

The buildings are very old and worn. There are five wards in the men's department in use now, and four empty wards which are to be opened shortly, and 35 beds on the women's side. Besides this there is private-ward accommodation for 24. This hospital shares with St. Luke's Hospital most of the accident work in Shanghai. The method of heating is by stoves, and lighting by electricity. There are no elevators in the building and no X-ray machine, which is

rather a pity on account of the large number of emergency cases brought here. There is one operating room in the institution, which is not as well equipped as it might be, and one small pathological laboratory which is moderately well fitted for minor work. Transportation of patients within the hospital is done by means of ward carriages and stretchers. Toilet facilities consist of wooden buckets, and the water comes from the city water supply. Disinfection is done by the municipal health department.

The nursing staff consists of two English graduate nurses, one to run the men's department and the other the women's. There are seven Chinese student dressers on the men's side and five probationary Chinese girl nurses on the women's side. The medical staff consists of two British and three Chinese doctors, of whom one qualified in England and the others locally.

The charges for patients are as follows:

General wards, free, or \$0.15 Mexican per day.

Private wards, \$1 to \$3 Mexican per day.

Out-patients, \$0.10 Mexican a visit.

Last year there were 530 in-patients, 21,524 out-patients, and 119 operations under an anesthetic.

In the year 1908 there was an epidemic of bubonic plague in Shanghai, necessitating such measures as removing the sick to the municipal isolation hospital, disinfection of private houses, etc., on the part of the health authorities of the foreign settlement. This caused severe riots among the Chinese, as they did not like being taken to a foreign hospital and did not wish to submit to such arbitrary treatment, as they considered it, at the hands of foreigners. To solve this matter a group of the better class of Chinese gentry came to the municipal health authorities with a proposition to establish an isolation hospital which should be located in a Chinese quarter of the town and run by them. The result was the so-called Chinese Public Isolation Hospital and the Chinese Cholera Hospital, which are supported partly by the fees of patients and partly by the Chinese authorities. The Chinese Cholera Hospital is open only during the summer months and has no definite site, some summers the authorities being able to procure one site and other summers another site. The isolation hospital is located on an extension of Honan Road, about three-fourths of a mile beyond the Shanghai-Nanking Railway station. The place is on the very edge of town. The institution consists of a brick three-story building and two wooden buildings for the hospital proper, and another brick building at the other end of the grounds for disinfecting purposes and as a crematory. The grounds are very spacious, and from inside the place looks as though it were absolutely isolated from town. A part of the grounds is used for growing vegetables for the institution. The capacity of the

hospital is 62 beds. Cases of scarlet fever, smallpox, diphtheria, plague, and beriberi are taken in.

The nursing staff is made up of foreign-trained Chinese girl nurses. Dr. Stafford Coxe is the physician of the institution. The laboratory work is done by students of the Harvard Medical School of China in the so-called rat room, and by the municipal health laboratory staff. It is a strange sight to see a child having scarlet fever with the whole family camped in the same room. It is very often impossible to separate the child from the family even in cases of the most infectious disease. As a consequence, to the regular fees of the patients is added \$0.15 Mexican a day for each so-called attendant for "chow money."

The Margaret Williamson Hospital (figs. 10 and 11), run under the auspices of the Women's Union Missionary Society of America, is located on Siccawei Road, outside the west gate of the Chinese city in the French settlement. For this reason it is commonly known as the West Gate Hospital. The Pont Ste. Catherine and railway station street car line passes the place about 2 miles out from the French Bund. Owing to its proximity to canals holding stagnant water, the hospital grounds are infested with mosquitoes. Back of the buildings are some pretty grounds, with grass, shrubbery, and trees. Dr. Elizabeth Reifsnnyder built a hospital on the land now occupied by the present one in 1885. Previous to this she had been doing medical work amongst the Chinese in a neighboring vicinity of the Chinese city. This building, however, was burned down, and the present one put up in 1889 with funds given wholly by Chinese and foreigners in Shanghai itself. Approximately three-fourths of the support of the institution comes from fees and local contributions, mostly Chinese, and one-fourth from the income of beds which are endowed in the United States. The doctors' and nurses' salaries are paid by the missionary board.

The hospital is made up of four brick buildings of two and one-half stories, which are all connected by closed passageways. The first has a clinic room, chapel, and drug room on the first floor; and on the second floor a suite of rooms for doctor and foreign nurse, two private rooms with two beds, and one with four beds. The two operating rooms are in another building; the clean cases being cared for in the one on the upper story and the dirty cases in the one on the lower floor. Both operating rooms are very well equipped. The light is good and the surgical and sterilizing appliances full and up-to-date. The third building contains the Williamson ward on the second floor, with 17 beds, and the Wells Williams ward on the lower floor, with 29 beds. Besides these there are two semiprivate wards, one containing 6 beds and the other 4 beds, and one private

room with 2 beds. The last building is the Stevens Maternity Hospital, containing two well-equipped delivery rooms, one for clean cases and another for septic ones—35 beds for clean deliveries and 7 for septic ones. The whole hospital is kept scrupulously clean and the floors, which are covered with Ningpo varnish, are scrubbed twice daily. The maternity ward is steam heated, and the other buildings supplied with stoves. The institution is lighted by electricity and furnished with running hot and cold water. The buildings have no elevators, and the hospital is supplied with one kitchen.

This institution admits only Chinese women and children, with boys up to 12 years of age. No foreigners or contagious cases are taken in. There were 56,620 out-patients treated last year and 1,034 in-patients, of whom 351 were obstetrical cases.

The fees charged patients are:

In big wards, \$0.15 (Mexican) daily.

In semiprivate wards, \$0.50 (Mexican) daily.

Beds in private rooms, \$2, \$4, and \$5 (Mexican) daily.

Those unable to pay are treated gratis, and a large proportion of the patients are of this class.

The medical staff consists of four doctors—Dr. Elizabeth Reifsnnyder, Dr. M. Emily Garner, Dr. Mary E. Newell, and Dr. Julia N. Wood. The first two are at present at home on leave. The nursing staff consists of Miss Bethra Miller, an American graduate nurse, in charge of 20 Chinese girls in training.

The St. Elizabeth's Hospital (fig. 12) is a missionary institution for Chinese women and children under the auspices of the American Church Mission. It was founded 12 years ago, and its first doctor was Dr. Stevenson. Situated on No. 2 Avenue Road within the confines of the international settlement about 1 mile from the Bund, it is in a healthful locality, as the municipal health department takes such measures within its sphere as draining or covering with oil all stagnant pools, etc. One-quarter of the hospital support comes from the mission and three-quarters from local fees and contributions.

The hospital is made up of three brick buildings, the main three-story one with five wards and three private rooms, containing in all 85 beds, the dispensary, with two stories, and the two-story servants' quarters. One of the wards is for maternity cases, and adjoining it is a well-equipped delivery room. Another is for surgical cases, and next to it is the well-equipped operating and sterilizing room. Another is an open-air ward for tuberculosis cases. The hospital is kept clean and sanitary, but there is no heating system, not even stoves. There is running hot and cold water, but no such appliances as X-ray and elevators. The buildings are lighted by electricity. There is one kitchen as well as two diet kitchens.

Only Chinese women and children are taken in, and no foreigners or contagious cases are admitted. Last year there were 660 in-patients and 15,719 out-patients. The charges for patients for other than charity cases are as follows:

General ward, \$0.20 (Mexican) daily.
Maternity ward, \$0.30 (Mexican) daily.
Semiprivate rooms, \$0.50 (Mexican) daily.
Private rooms, \$2.50 to \$3 (Mexican) daily.
Delivery fee, \$5 (Mexican).
Operation fee, \$5 to \$10 (Mexican).

The medical staff consists of two American physicians—Dr. Ellen C. Fullerton, who is at present home on leave; and Dr. G. F. Alsop. The nursing staff consists of Miss Laura Lenhart, a graduate American nurse, with 16 Chinese girls in training under her.

Besides the hospitals above mentioned is the so-called Paulun Hospital, situated quite close to the St. Elizabeth's. It is a small institution run by a firm of German doctors in Shanghai for Chinese, and is a private concern. One-half of it has been shut down since the beginning of the present war.

When the ships of the Yangtze Squadron leave Shanghai, the first stop is Chinkiang. On top of the hill and overlooking the foreign settlement and the river is the only hospital in the port, the Chinkiang General Hospital (fig. 13). It was founded in 1909 by the Shanghai-Nanking Railway, so that the railroad surgeons could have some place in which to treat the employees of the railway, both Chinese and foreign. It is located in the coolest spot about the concession, and in the summertime, if there is a breeze to be had, the hospital gets the benefit of it. It is about 10 minutes' walk from the concession and several degrees cooler in the summer. The building is two stories high, semi-Chinese in construction, and is built of Foochow poles, brick, and mortar. It was the original building put up for the draftsmen working for the railway. It has accommodations for 14 Chinese and 4 foreign patients. There are 6 wards and 10 rooms. One of the latter is used as an operating room, and a varnished wooden table is used for operating purposes. There is no running water, and the place is heated by stoves. The hospital depends on the loan of instruments by doctors, and, of course, there are no such luxuries as an X-ray machine, an elevator, etc. When one considers that during 1913, 38 major and 158 minor operations were done, one begins to appreciate how much can be done with little at hand with which to do it. During 1913 there were 13 foreign in-patients, 14 foreign out-patients, 114 Chinese in-patients, and 1,081 Chinese out-patients. All kinds of diseases are treated except dangerous infectious ones, which are not taken in, as there is no nursing staff for that work.

The nursing staff consists of one English trained nurse, the matron of the hospital, and Chinese orderlies. The surgeon of the railway is *ipso facto* the medical officer in charge of the hospital. The present incumbent is Dr. H. Balean, M. D., B. S. (London), F. R. C. S. (England). He held most of the resident appointments at the London Hospital, and he was also demonstrator of anatomy and physiology, and a lecturer in midwifery to the Central Midwives Board. While at the hospital, he took nine exhibitions in scholarship. There is no other physician connected with the hospital.

Although the hospital has no official connection with the Red Cross Society of China, yet both Dr. H. Balean and Miss Halley, the matron, are members of that organization. The staff of this hospital was prominent in the recent revolutionary troubles. In 1911 Dr. Balean organized an ambulance party, called the Chinkiang Ambulance Party, amongst the Chinese residents and those foreigners who were willing to help. These latter included the staff of the hospital. The hospital committee put the institution at the disposal of Dr. Balean, and the Chinese loaned some well-built houses for hospital purposes. Mat sheds were also built on the hospital grounds. The ambulance party collected the wounded from around Nanking, and in all treated some 400 cases. In the 1913 disturbances Dr. Balean was put in charge of the Red Cross work of the district by the Red Cross Society of China. Owing to the proximity of the fighting, the hospital was moved into the concession, and the committee decided that the wounded could not be brought within the confines of the foreign settlement. Dr. Balean and his party numbering in all some 150 men, therefore, got accommodations for about 1,000 wounded outside the concession. After the immediate danger to the foreign community was passed, the hospital was moved back to the old building, and there several cases for operation and special nursing were taken in. Only about 30 in all, however, were admitted to the Chinkiang General Hospital. The matron looked after those who were admitted, and the hospital orderly, when not employed in the institution, rendered valuable assistance to the Red Cross party, as did also the surgeon from a gunboat in port, two missionary doctors, and a certain foreigner who acted as night orderly in 1911. All other helpers were members of the Red Cross Society of China or soldiers who came with their wounded friends. It is interesting to note that the total mortality was only 7 per cent in spite of the lack of trained assistants.

The hospital has been made use of by surgeons of the British and American Navies, and several severe medical and surgical cases have been successfully handled. The location of the hospital is good. The building as it stands makes one undertake only operations of emergency, in spite of the fact that all foreign cases so far operated upon have been successful. For this reason also one can not make

full use of the opportunities afforded in the way of clinical material. Naval surgeons are welcome at the morning clinics, but must turn their cases over to Dr. Balean when they are taken to this hospital.

The fees for patients are as follows:

Europeans:

First class, \$8 (Mexican) daily.

Second class, \$5 (Mexican) daily.

Chinese:

First class, \$1.50 (Mexican) daily.

Second class, \$0.50 (Mexican) daily.

Use of the operating room, \$3 (Mexican).

The above are simply the hospital charges; medical attendance is in addition to this.

After Chinkiang, the next calling point for Yangtze gunboats is Nanking, the old capital city of China, and the scene of many a bloody battle. There is one hospital in this port for foreigners alone, and it is a veritable boon to the foreign residents of the city, of whom there are quite a number. It is called the Memorial Hospital. Besides this foreign hospital, are two of long standing, which have been recently incorporated with the University of Nanking Medical School, and which consequently are at present going through a transition stage, owing to the big improvements that are being made in all parts of the medical school. In addition to these institutions there is also the Quaker Hospital for Chinese Women, under the auspices of the Quaker Mission.

The Memorial Hospital was opened in November, 1913. It is located in the western portion of the city—Utaishan—in a very quiet place, away from all noise, and about 5 miles from Shaikwan, where the ships anchor. The only means of transporting patients from the ships' landing to the hospital is by carriages, by ship stretchers, or by rickshaws, plenty of which are hanging round the Bund.

The institution was built by A. J. Bowers, president of Nanking University, and presented to the foreign community of Nanking by him in memory of his late son. A local board holds the property in trust for the community, and the hospital is supported by voluntary subscriptions and fees of patients. The building is a two-storied structure with a cellar. It is 53 feet long and 45 feet broad, with large verandas on the east and south. There are no wards, but eight private rooms with nine beds. There is one operating room, which is fairly well equipped for a small hospital in an outlying port. There is one so-called contagious ward, and facilities for disinfection are good. No cases have been heretofore rejected. The building is heated by open grates and stoves and lighted by kerosene lamps. There is no running water. Toilets are the box variety, and, of course, there is neither elevator nor X-ray machine.

There is one American graduate nurse in charge of the hospital, and as many Chinese trained nurses as required can be had, since the training school is near by. The medical staff consists of all the foreign doctors resident in Nanking. There are 11 American medical men connected with the University of Nanking Medical School besides other local practitioners. Naval surgeons can treat their own cases in this hospital and when they leave port turn them over to some of the doctors mentioned. The fees charged are \$5 Mexican per day for first-class and \$4 per day for second-class patients, which includes board, room, and nurse, and for the use of the operating room \$25 Mexican for major cases and \$10 for minor ones. The hospital is open only to foreigners.

The institutions for Chinese, the Methodist Episcopal Hospital, and the Drum Tower Hospital have been run in connection with the medical department of the Nanking University since the beginning of the year. The Methodist Hospital, or the Philander Smith Memorial Hospital, as it is also termed, is affiliated with the university and is used as a teaching hospital, while the Drum Tower Christian Hospital is incorporated with it. The former was built in 1885 and was the first hospital to be opened in Nanking. The money for the main building, \$10,000 gold, was given in the United States. Other buildings have been added since, such as a dispensary, open-air ward, and buildings for private patients, etc. The main hospital building is a two-story brick structure, with accommodation for 80 patients in its wards. There are, of course, no such accessories as an elevator, an X-ray machine, running water, etc. It is lighted with oil lamps and heated by stoves and open fireplaces. The operating room is fairly well equipped for a native hospital in an outlying port. During the year some 1,000 patients resided in the hospital and 20,000 visits were made to the dispensary. Private rooms in a small secondary building are at hand for those who want special care and do not wish to go into a general ward with other patients. A large compound and many trees around the hospital afford a quiet and salubrious retreat with uncontaminated air, well calculated to help the sick and suffering back to health. The hospital is located at Han Sin Men, about $4\frac{1}{2}$ miles from where the ships anchor. The nursing is not of a very high order and is done by Chinese attendants. It is under the medical supervision of Dr. Robert C. Beebe, an American medical missionary, and since its affiliation with the medical department of Nanking University the latter faculty have much to do with the treatment of the patients. The institution is only for Chinese, and no one is turned away on account of the lack of funds.

The history of the so-called Drum Tower Hospital (it being located near the Drum Tower), now the Medical School Hospital of Nanking

University, is as follows: In 1888 a dispensary was opened at Tung-pailen, in the southern part of the city, by Dr. W. E. Macklin, of the Foreign Christian Missionary Society, and by 1890 he had secured the property on South Gate Street, opened a dispensary there, and taken in some patients. In 1890 he erected a Chinese building for a hospital at the Drum Tower. In 1891 money was raised in America for a hospital, which was finished in 1892. On account of the arrangement there was a basement, which served for many years as a ward for the poor, till land was bought on the east of the road for extension. This hospital is about 4 miles from the ship anchorage and is on the right-hand side of the road after passing through the Drum Tower gate. It can be reached by railway, carriage, or jinrickshaw. The Drum Tower Hospital was transferred to the university on January 1, 1914. It is now undergoing repairs and alterations. Preparations are now on foot to build a large, up-to-date, fully equipped hospital plant. A new building consisting of an operating pavilion and a clinical amphitheater is in process of erection. Near this it is proposed to build, as soon as funds are secured, a large out-patient dispensary building. In addition to this, as the work enlarges it is planned to erect a large general hospital and a smaller women's hospital, both built on the most modern principles. Up to this year in-patients have averaged from 600 to 1,200 a year and the out-patients from 3,000 to 4,000. Heretofore contagious cases have been cared for in small Chinese houses to the east of the main building. During the recent troubles 1,500 Red Cross cases were cared for in this institution, and many men, women, and children protected when the city was being looted. It was at the request of Drs. Macklin and Brown, who were then in charge of the hospital, that Chang Hsung stopped the looting of the city.

The nursing up to this year has been done by Chinese attendants. The teachers in the medical school are as follows: Dr. J. E. Williams, president; Dr. R. T. Shields, dean; Dr. N. W. Brown, secretary; Dr. P. S. Evans, Dr. W. E. Macklin, Dr. R. C. Beebe, Dr. J. Butchart, Dr. S. L. Lasell, Dr. T. D. Sloan, Dr. W. G. Hiltner, Dr. F. P. Gaunt, and Prof. Alexander Lee.

This institution is a teaching missionary hospital, and patients are not turned away for lack of funds. Never having visited the Quaker Hospital, I am unable to give information relating to it.

The next port on the Yangtze where gunboats stop is Wuhu. Here is a hospital, called the Wuhu General Hospital (fig. 14). Medical work was started in this city by the Methodist Episcopal Mission in 1881. The hospital building was erected in 1890 by Dr. George A. Stuart. Dr. Hart came in 1895 and stayed till 1913, when he died of typhus fever, contracted from one of his many cases. Dr. Henry S.

Houghton came to the field in 1906 and stayed till 1911, when he left to become dean of the Harvard Medical School of China. Dr. Baldwin took charge for six months after Dr. Hart died, and was followed by Dr. Ernest M. Johnstone, who is the present incumbent. The institution is situated about 2 miles from the Bund, in the coolest and most salubrious spot about Wuhu. The hospital is built on a little hill overlooking the Yangtze, with very few habitations in the immediate neighborhood. It is a general mission hospital, under the auspices of the Methodist Episcopal Mission of the United States of America. There is one central gray-brick building of two stories, with four additional smaller buildings. Private rooms for Chinese men are in one of these, the kitchen in another, and the dispensary in still another. The central building has 70 beds. It has four private rooms for foreigners and four for Chinese women. The rest of the beds are in four wards. In the basement is the so-called ulcer ward, where dirty cases are treated. On the first floor are the operating room, dressing room, a chapel, and two large wards for men. On the second floor are four rooms for foreigners, four rooms for Chinese women, a laboratory, and ward for Chinese women.

The hospital is lighted by kerosene lamps, heated by stoves, and well screened. There is no X-ray room, but a very good laboratory for an outport hospital. The operating room has an Arnold sterilizer and is simply an ordinary room used for operating purposes, but is fairly equipped for an outport hospital. The water supply is boiled and filtered river water.

The nursing staff consists of one foreign graduate nurse, six Chinese pupil girl nurses, and several male attendants. The medical staff consists of Dr. E. M. Johnstone, a graduate of Rush Medical College and a Cook County man, and a locally trained Chinese doctor. Dr. Johnstone lives in a house very close to the hospital, and hence can be reached at a moment's notice. There is shortly to be another foreign doctor attached to the institution.

Naval sick are admitted to this institution and are quartered in the private rooms for foreigners on the second floor. The fees charged Navy personnel are 6 taels daily for officers and 4 taels for men. The whole institution is undergoing some radical changes just at present.

The next port up the river from Wuhu is Anking. This is not an open port, so that gunboats do not stop here very often, except in troublous times. Probably the best-equipped hospital on the river, except those in Shanghai and Hankow, is here—St. James Hospital (fig. 16). The old St. James Hospital was opened to patients in September, 1901, and was built by Dr. E. L. Woodward. The salaries of the foreign staff and about one-fourth of the annual expenses are provided by the Protestant Episcopal Church in the United States of

Laning—Yangtze River Hospitals.



Fig. 13.—Chinkiang General Hospital.

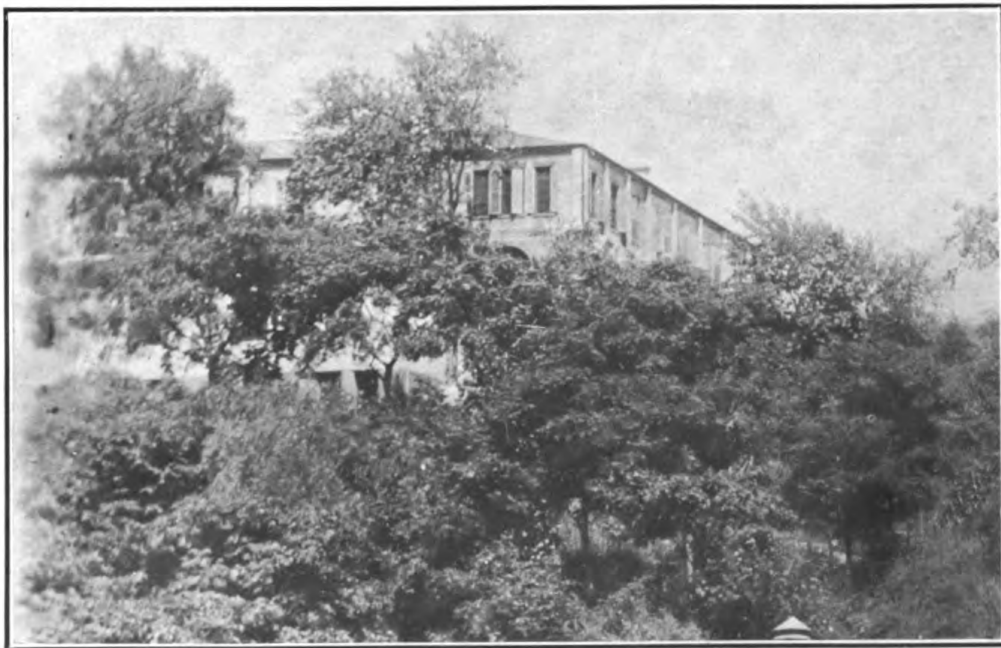


Fig. 14.—Wuhu General Hospital.

Laning—Yangtze River Hospitals.



Fig. 15.—Elizabeth Skelton Danforth Memorial Hospital, Kiukiang.



Fig. 16.—St. James Hospital, Anking.

America, the remainder being raised by patients' fees and gifts from Chinese.

The institution is located in the northeast corner of the city, about 1 mile from the river. It is easily accessible, and surrounded by ample grounds, making the location airy and healthful. The building is of brick, in the shape of the letter E. It has a frontage of 150 feet, and has two stories in front and three in the wings, the ground sloping backward, giving room for the basement. The hospital admits both men and women, and has a capacity at present of 70 beds, as the nurses are quartered in the building. Just now there are five wards for men, four for women, as well as four private rooms (two with verandas) for men and one for women. About 1,100 in-patients and over 40,000 out-patients are treated annually. The institution has a widely distributed general medical and surgical work, with a great many skin and eye cases. Facilities for operative work are as good as in any hospital of its size in China. There is a special operating room for clean cases. Two rooms in an out-building are available for contagious cases at present, with plans for a special building in the near future. The laboratory is not first class as yet, but is to be improved as soon as the staff is enlarged. The purpose of the hospital is the treatment of the Chinese as well as its function as a missionary agency, but foreigners have been and can be accommodated in the private rooms.

The physician in charge, and at present the only foreign physician, is Dr. H. B. Taylor, University of Virginia, 1902, interne in St. Vincent's Hospital, Norfolk, Va., with courses and work in Boston and New York hospitals for two and one-half years. Dr. Taylor has been on the staff of this hospital since his arrival in China in March, 1905, and has been in charge since June, 1908. The medical staff includes three qualified Chinese doctors, one woman and two men. The nursing staff is made up as follows: Miss M. R. Odgen, R. N., graduate of Blockley, Philadelphia; Miss S. C. Tomlinson, R. N., graduate of Boston City Hospital; Miss A. J. Lowe, graduate of Boston City Hospital; besides 9 women and 18 male pupil nurses (Chinese).

The fees charged Chinese are as follows:

Private rooms, \$1 Mexican per day.

Small wards, \$0.50 Mexican per day.

Large wards, \$0.20 Mexican per day.

When sufficient funds can be collected it is proposed to build a new women's hospital, at which time the present hospital will be given over entirely to men. It is also proposed to build a home for nurses and an isolation ward. Naval surgeons are welcome to take their cases to this hospital, and Dr. Taylor would be glad to let them treat their own cases here if they so wished. He would also be

glad to have them observe and treat the cases that come into his clinic for the sake of experience. This institution was the local Red Cross hospital during the recent troubles, and Dr. Taylor was given honorary membership in the Red Cross Society of China for the work done.

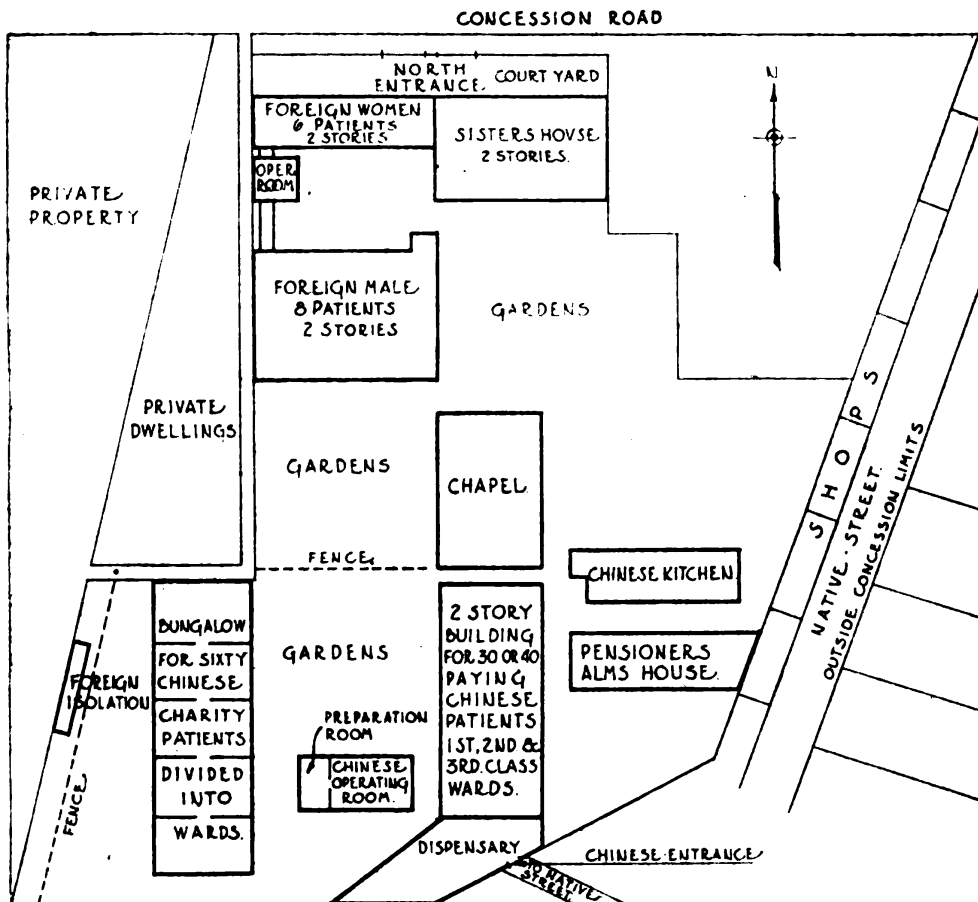
After leaving Anking we come to a treaty port called Kiukiang. Gunboats spend quite a large portion of the time here, as there is a mountain resort called Kuling about 14 miles away, where there is quite a large colony of foreigners. There are two hospitals in this city, St. Vincent's and the Elizabeth Skelton Danforth Memorial Hospital, which latter is for women.

St. Vincent's Hospital belongs to the Lazarist Mission (French Roman Catholic), and the administrators are the Sisters of Charity, St. Vincent de Paul, a French nursing sisterhood, though recruited from amongst all nationalities. A hospital for Chinese was established some 40 years ago by the Lazarist Mission on the British concession in Kiukiang. At first, until about 1897, the management of the institution was in the hands of the Lazarist Mission—a mission of French fathers—and the community doctor attended the patients, assisted by Chinese male and female helpers. In the year above mentioned the mission arranged with the Sisters St. Vincent de Paul to manage the hospital for them. The community doctor became a sort of consulting physician, with little to say in the management of the institution. Within the last 10 years various additions of a nonmedical nature have been added to the hospital, such as a boys' school, a chapel, and a pensioners' home. The female part of the hospital was done away with shortly after the sisterhood took over the administration, as with the establishment of the hospital for women of the Methodist Episcopal Mission, situated in the native city, it was felt there was no need for two such institutions. The hospital has therefore for some years confined its work entirely to men. Part of the cost of the present buildings was defrayed by contributions by friends of the institution. The sisters gave the site, and the bulk of the cost of building and equipment fell on them. The building had accommodation for three second-class and two first-class foreign patients. In 1909 this accommodation being found insufficient for modern requirements, a second story, to allow for treatment of four first-class patients, was added to the building, and also a small operating room.

The whole cost of these improvements was borne by the mission, which has expended up to date some 4,000 taels in establishing this hospital for foreigners, particularly for the officers and men of men-of-war and merchant steamers plying on the Yangtze.

Within the last year considerable changes have been in contemplation, and an entire rearrangement of the hospital buildings, both

Chinese and foreign, has been commenced. When the rearrangement is completed the foreign hospital will have wards for women and children of foreign extraction, the operating room will be enlarged, and a small laboratory equipped. The accommodation will then consist of about three rooms for women and children, with beds for four patients, four beds for second-class male patients, and three beds for foreign male patients (first class). In all, a dozen foreign patients can then be cared for. In 1913 the isolation ward for foreigners was erected on the hospital grounds; it is of bunga-



Rough plan of St. Vincent's Hospital, Kiukiang.

low style, with a veranda, and has accommodations for three, or in a pinch four, infectious cases. It is built with special regard to cleanliness and ventilation.

The charges for naval patients are 8 taels first class and 5 taels second class, which includes attendance by the community doctor, who is the medical officer in charge of patients in the foreign hospital. The institution is supported entirely by the Catholic mission, aided by voluntary contributions and the fees received from foreign pay patients. It is situated at the extreme edge of the

English concession and is about two minutes' walk from the public landing jetty on the river front.

The hospital is easily accessible for landing parties with stretchers. When the alterations are completed it will be as healthy an institution as any in the British concession. A rough plan of the improved hospital accompanies this article. The new structure will be completed about the end of this year. The construction is to be throughout of brick, and the arrangement is to be on the pavilion plan. Of course there are no such luxuries as electric lights, running water, elevators, etc., in these outlying ports.

The portion of the hospital dedicated to the needs of the Chinese, who are now lodged in a large one-story building not very suitable for modern treatment, will be two large buildings running north and south of the property. In one building, which is a two-story structure, accommodation will be arranged for some 40 paying Chinese patients, of whom 25 will be third class and the remainder first and second class. The fees for treatment have not yet been arranged, but will be scheduled to meet the pockets of all classes. In the other building, a one-story bungalow, will be accommodation for about 60 charity patients, who will pay nothing for their treatment and will be housed in small wards containing 8 and 10 beds each. Outside Chinese patients and members of native crews of men-of-war can be admitted to the paying hospital for Chinese. To the charity hospital only those cases that the sisters wish to admit can be taken in. The community doctor is in medical charge of the paying hospital for Chinese, but is only consultant to that of charity for Chinese.

Dr. Alexander C. Lambert, a graduate of Toronto University Medical School, and one who has done much good work in the study and research in tropical diseases, is the physician and surgeon in this hospital, as well as the community doctor. Naval cases, when taken to this institution, are put under his charge, but he is very glad to have naval medical officers see the cases with him. He also is very good about letting naval surgeons observe his Chinese cases.

With the improved facilities which the reconstruction of the hospital will bring about there is no doubt that more surgery will be done each year. At present there is a vast amount of medical material begging for investigation. The sisters, and the mission generally, have awakened to the fact that research is productive of good results, and they are encouraging it as much as possible.

During the summer of 1913, while the fighting was going on around Kiukiang, the hospital took in over 200 wounded from the northern forces. Great assistance was rendered by American and British naval surgeons attached to the gunboats in port at that time, without whose help work could not have been carried out.

The following list shows the variety of diseases one comes in contact with in this hospital, as well as in others along the river:

FEVERS.—Malarial (quartan, tertian, and malignant tertian); relapsing, frequent in the spring; kala-azar, occasional cases; typhoid, fairly common; unclassified fevers, numerous.

DYSENTERIES.—Principally endamebic.

HELMINTH INFECTIONS.—Ancylostoma, about 25 per cent of all cases treated; schistosoma, common, later stages especially; ascarides, usual frequency; clonorchis, uncommon; fasciolopsis, uncommon, *F. buski* has been seen; tapeworm, no cases seen in five years.

EPIDEMIC DISEASES.—Cholera, sporadic more than epidemic; exanthemata, measles, smallpox, chicken-pox.

TUBERCULOSIS.—Common in all its forms, medical and surgical.

The inhabitants of the Kiangsi Province are very conservative as regards surgery, but they are taking to it more readily every year. Bone diseases, tumors, and the results of Chinese surgery are the things one is called upon most often to treat.

The Elizabeth Skelton Danforth Memorial Hospital (fig. 15) for Chinese women was finished in 1910, under the auspices of the Methodist Episcopal Mission of the United States of America, although medical missionary work had been going on for some time before. One-half of the support of the hospital comes from the Methodist Episcopal Mission, and the other half from fees collected from pay patients. The institution is located within the native city, one mile from the Bund. It is easily accessible and healthfully located in a place with good ventilation and drainage. The hospital is constructed of brick and shaped like a double E, with two stories containing 7 large wards, 21 rooms, and 100 beds. The operating room is well equipped. There is an isolation ward of six large rooms and a ward kept for treating foreign women. The grounds around the building are fairly spacious, covering four or five acres. It is contemplated to add a cripples' home to the institution. The hospital averages 17,000 dispensary patients a year, and over 800 in-patients. The fees charged are up to \$5 Mexican per day. Dr. Mary Stone, a Chinese physician, with an M. D. from the University of Michigan medical department, and experience in the hospitals of Boston and New York, is in charge. She has the reputation of being a very good surgeon. Dr. Lambert, the community doctor, and Dr. Perkins, a medical missionary, are consulting physicians to this hospital.

The nursing staff consists of 25 Chinese girl pupil nurses. Although a women's hospital, a great deal of work was done in the dispensary for the wounded during the recent fighting around Kiu-kiang, and some special cases were admitted into the hospital itself.

Hankow is the next stop for gunboats up the river. This city is next only to Shanghai in this part of China in the number of foreign

residents. The closed port of Wuchang is just across the river, and boasts of two missionary hospitals. In Hankow there is one hospital for the treatment of foreigners only—the so-called Hankow International Hospital. Then there are the Catholic Mission Hospital for both Chinese and foreigners, and the Hodge Memorial Hospital for Chinese only.

The two medical institutions across the river in Wuchang are the American medical missionary hospitals, the Church General, and the Elizabeth Bunn Memorial Hospitals.

The subject of establishing a hospital for the benefit of the foreign residents of Hankow by the settlements of the four European countries, Great Britain, Germany, Russia, and France, came up in 1908. Subscriptions were taken from the individuals of the various nationalities, amounting to 30,000 taels, and the Russian, German, French, and British municipalities each gave 15,000 taels with which to erect the proposed building. Although the hospital was not yet completed at the time of the 1911 revolution, that part of it which was done was used at that time to care for a large number of the wounded. The institution was officially opened in September, 1912. It is supposed to be self-supporting, but heretofore it has not quite been so, and the various municipalities have made up the deficit. The hospital is run by a board of governors, two from each afore-said foreign municipality.

The institution (fig. 17) is built upon a plot of ground at the back of the Russian concession, and consists of one main building with three stories and a basement, one single-story building for an isolation ward, and another one, near the gate, containing a morgue, post-mortem room, and a room for washing linen. All the buildings are of the same material, with hardwood floors, high ceilings, and big windows. The hospital is heated with steam, lighted by electricity, furnished with running hot and cold water, and plenty of ice is to be had. In the main building the kitchen is on the basement floor and is very well equipped and clean; also the laundry, ironing room, coal cellar, and the storeroom. On the first floor are three wards, containing six beds each, two bathrooms with flush toilets, hot and cold water and porcelain bathtubs, and an office. On the second floor are six large first-class rooms with verandas, a large operating room, a fairly well-equipped laboratory, a dispensary, waiting room, and two bathrooms similar to those below. The sisters live on the top floor. The operating room has running cold and hot water, electric lights, a good sterilizing outfit, a good operating table, and a fair supply of instruments. The great trouble in the operating room is that the surgeon feels that he must oversee everything, as the sister in charge is not as yet very experienced. Naval surgeons, as a rule, when operating bring over either a hospital steward, an apprentice, or both, to assist.

The nursing staff is made up of six members of the Order of the Franciscan Missionaries of Mary, who are very devoted, but as yet somewhat inexperienced in the work. Any local foreign practitioner or naval surgeon can bring his cases here and attend them himself. There is no resident physician. As a matter of fact, over 50 per cent of the patients in the institution last year were naval or military cases. The physicians in town take turns in being what might be called the medical adviser of the hospital, each nationality taking its turn in order of precedence.

Hospital charges are as follows:

The wards of the general hospital:

First class, \$6 Mexican per day.

Second class, \$4 Mexican per day.

Third class, \$3 Mexican per day.

Special charges for naval and military patients belonging to the following nationalities, viz, Russian, French, German, and British:

Officers in first-class wards, \$4 Mexican daily.

Petty officers in second-class wards, \$3.50 Mexican daily.

Men in third-class wards, \$2.50 Mexican daily.

The infectious wards, all cases, \$6 Mexican daily.

The use of the operating room is free to all *bona fide* inmates of the hospital, but for patients under 10 days' residence there is a charge of \$15 Mexican. Ten dollars Mexican is charged for the use of the disinfecter, except in the case of *bona fide* patients, for whom it is gratis. Two second-class fares are charged to those employing a private nurse, provided the patient and nurse occupy the same room. In the morgue for bodies sent in by the authority of the councils of the four concessions, 10 taels are charged if a post-mortem is made, and 2 taels per day for storage. For all other nationalities and authorities the charges are 25 taels for post-mortem and 5 taels per day for storage.

The diseases which can be sent to the infectious wards are: Typhus fever, variola, varicella, epidemic cerebrospinal fever, acute forms of puerperal fever, rubiola, rubella, acute septic sore throat, diphtheria, scarlatina, pertussis, epidemic parotitis, epidemic influenza, dengue, cholera, anthrax, hydrophobia, glanders, erysipelas, and acute tuberculosis attended by profuse expectoration of bacilli.

The only other hospital which is located within the foreign settlement is the Roman Catholic Mission Hospital (figs. 18, 19, 20, and 24), a short history of which is as follows:

On the 1st day of May, 1880, a hospital for Chinese was opened in Hankow, chiefly through the efforts of Bishop Vaudagna, procurator of the Catholic mission, and of Dr. Begg. A small, unpretentious building was given for the purpose by the Catholic mission under Bishop Zanoli, and it was handed over to the doctor and the Canossian Sisters of Charity to be conducted as a purely medical and

surgical charity for Chinese. The first nurse and directress of the hospital was Mother Caroline Tarchini. For 25 years Mother Caroline, as she was commonly called, continued in this office and service of charity to Chinese and foreigners, till her death in 1905. For 15 years from 1880 to 1895, Dr. Begg devoted his time and best energies to the welfare of his patients, both Chinese and foreign, and under him the institution became well established. Improvements were made under the direction of Dr. J. D. Thompson from 1899 to 1904, and of his brother, Dr. J. A. Thompson, from 1899 to 1914. One of the present buildings was opened in 1893. Financially, the hospital has never quite been self-supporting; it has been found necessary to have recourse to the community, and when this is not sufficient, the general funds of the Roman Catholic mission may be called upon.

The hospital is located about 200 yards from the Bund in the British concession just back of the Hankow Club, and is readily accessible by jinrickshaw or stretchers. One of the attending doctors lives next door. The institution is heated by stoves and lighted by electricity. There are two principal buildings, one the old hospital in which the first floor is for Chinese and the second floor for foreigners, and the new Chinese annex with three floors, built of brick, cement floors, and equipped with all modern appliances. The old building was opened in 1893, and the new annex last year. There are two well-equipped operating rooms. The hospital has 23 beds for foreigners and 15 wards. There are 30 rooms in the Chinese annex with 160 beds. In addition to the above there is a small isolation ward containing three beds for foreigners and three for Chinese, which are usually occupied by cholera and smallpox cases. Last year there were 30 cases of the latter treated here, and in 1908, 25 cases of cholera in foreigners. During the revolution of 1911, 700 Red Cross cases were cared for in this institution.

The purpose of the hospital is principally to treat sick Chinese. Last year over 1,300 in-patients and 2,400 out-patients were cared for. This was of course before the new Chinese annex was built. The rooms for foreigners are quite airy and comfortable and heated by stoves.

The nursing staff is made up of eight sisters of the Canossian Order of northern Italy and southern Austria, six for foreign patients and two for Chinese. They understand English. In the foreign hospital the sisters have Chinese orderlies for assistants. In the Chinese hospital there is a scheme underway of having a regular school for Chinese male nurses. The medical staff consists of two Scotch physicians, Dr. A. H. Skinner and Dr. R. Aird. Although other doctors in the community are allowed to bring their patients

Laning—Yangtze River Hospitals.



Fig. 17.—Hankow International Hospital.



Fig. 18.—Catholic Mission Hospital, Hankow.

Laning—Yangtze River Hospitals.



Fig. 19.—Catholic Mission Hospital, Hankow. New building.



Fig. 20.—Catholic Mission Hospital, Hankow. Third - class ward.



Fig. 21.—Hodge Memorial Hospital, Hankow.

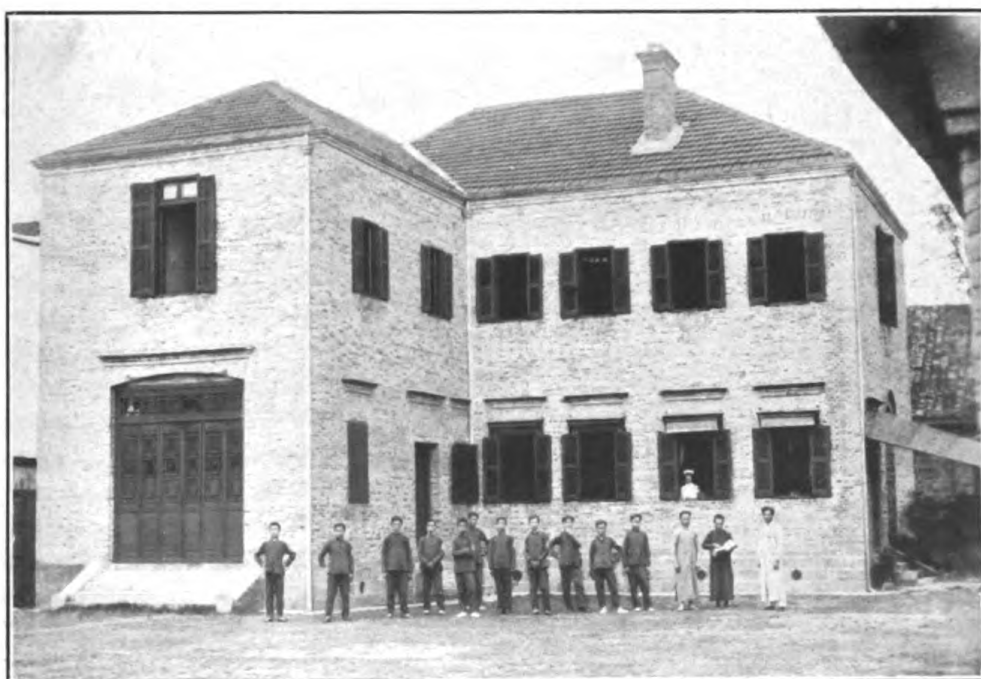


Fig. 22.—Hodge Memorial Hospital. Male nurses' quarters.

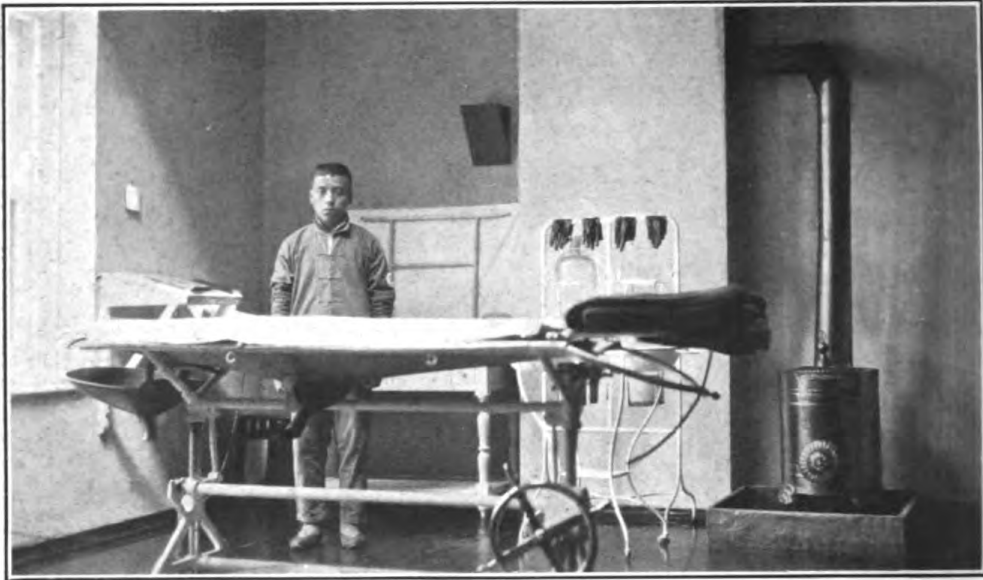


Fig. 23.—Hodge Memorial Hospital, Hankow. Operating room.

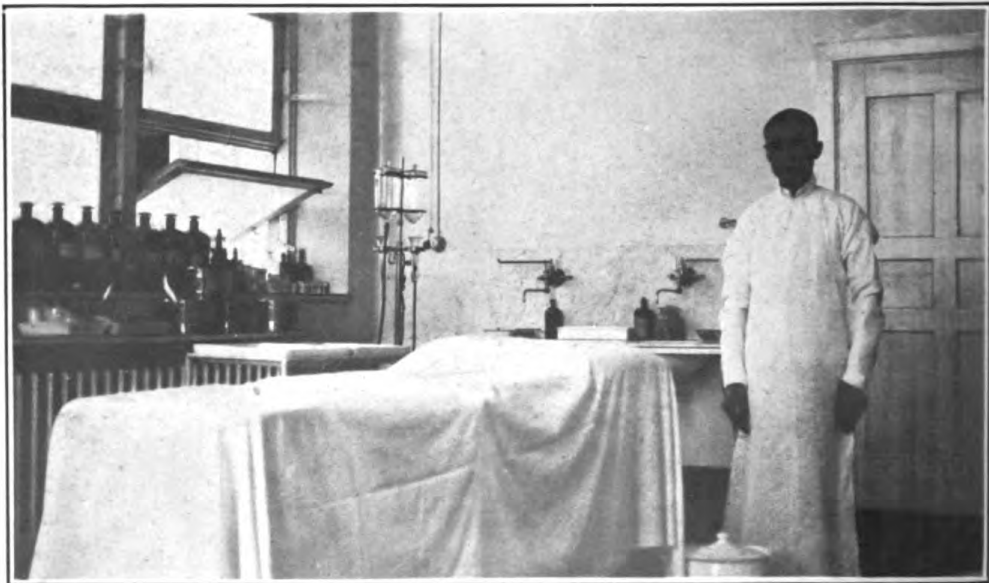


Fig. 24.—Catholic Mission Hospital, Hankow. Operating room.



Fig. 25.—Clinic Patients in front of Church General Hospital, Wuchang.



Fig. 26.—Church General Hospital, Wuchang. Nursing corps.



Fig. 27.—Elizabeth Bunn Memorial Hospital, Wuchang. Ward on Christmas day.



Fig. 28.—Elizabeth Bunn Memorial Hospital, Wuchang. Female nurses.

to this institution and attend them, naval surgeons are supposed to turn their cases over to the attending physicians. The fees charged in the hospital, exclusive of medical attendance, are as follows:

First class, or naval or military officers, \$4 Mexican per diem.

Second class, or petty officers, \$3 Mexican per diem.

Third class, or seamen and soldiers, \$2.50 Mexican per diem.

Chinese ward cases are charged 300 cash or admitted gratis.

As to whether he will take his cases to the International Hospital or to the Catholic Mission Hospital, the naval medical officer must decide according to the circumstances of the case. At the International Hospital he can treat his own cases, but in severe cases he must either keep a trusted steward or apprentice at the hospital or stay there himself, owing to the fact that the nursing is not all that is desired. Moreover, the port doctors, although they will take cases when the naval surgeons leave port, hesitate to turn the cases back again in case the ship returns before the recovery of the patient. At the Catholic Mission Hospital the attending doctor lives close at hand, and the sisters, having been longer in the work, are more experienced. The British Navy has a contract with the attending physicians of the Catholic Mission Hospital as to the fees, etc. The United States Navy has no contract with them, but the doctors usually charge according to the terms of this contract.

Located about $3\frac{1}{2}$ miles from the confines of the British concession in Hankow is the Hodge Memorial Hospital (figs. 21, 22, and 23), a missionary hospital for Chinese only, and one full of the most interesting clinical material. In 1864 Dr. F. Porter Smith, of the Wesleyan Methodist Mission (British), reached Hankow, and was the first medical missionary to travel up the Yangtze River and work in inland China. With the aid of an interpreter he at once commenced to attend and receive patients in two rented houses at Wu-Shen-Miao, which were situated almost on the same site as the present hospital building. In 1866 a new hospital was opened by Dr. Smith at the site of the above dispensary and was called the Hospital of Universal Love. In 1876 the hospital was closed, as Dr. Smith had to go back to England for his health. Dr. S. R. Hodge arrived on the scene in 1887, and in 1890 the foundation of the present hospital was made by the establishment of an out-patient clinic with a block containing wards, operating amphitheater, and assistants' rooms. In 1906 the name of the hospital was changed from the Hospital of Universal Love to the Hodge Memorial Hospital in memory of Dr. Hodge, who had died some little time before. In this year Miss Bessie Mountford came out as matron of the institution. At present Dr. A. W. Tatchell and Miss Mountford run the hospital together. One-third of the support of

the hospital comes from England and the other two-thirds from local contributions and patients' fees. The cost of maintenance amounts, roughly, to \$3,000 to \$3,500 gold a year. The hospital is located in the very midst of Chinese houses and is rather difficult to find the first time. It is made of seven buildings, mostly of brick, with two stories. Three of the buildings are made into wards, holdings 82 beds. There is also an isolation block with 4 beds for cases of emergency. The remaining buildings are for the kitchen, dispensary, and the nurses' quarters. The institution is provided with a good operating room, and it has electric wiring. There is no running water and the buildings are heated by stoves. It is proposed to increase the number of beds to 120 before long. For a Chinese hospital, this is unusually clean and well kept. By a special device, Dr. Tatchell has contrived to render the kitchen free from smoke and dirt. Rubber goods are made to keep almost indefinitely by placing them in a dark room which contains an open dish of kerosene and fitted with tightly closing doors. Dr. Tatchell has a well-equipped laboratory and tons of material.

During 11 months of 1913 there were admitted into the wards 1,153 medical and surgical cases; 14,973 out-patients were treated and 977 operations performed. Many cases have to be turned away for lack of accommodation. This hospital was in the center of activity during the revolution of 1911 and many hundreds of Red Cross cases were treated here. Dr. Tatchell holds two clinic days a week, and he is very glad to have naval surgeons come out to see his cases, and, when they come regularly, to help him out with the work. The nursing staff consists of 18 to 20 Chinese boys, divided into first, second, and third year classes. They have a very comfortable dormitory, and the nursing school is run by the matron. Nurses who have graduated from this hospital are in demand everywhere in China. Dr. Tatchell is at present the only medical incumbent, except one who is learning the language, and it is marvelous to see him get through the immense amount of work and to see the thoroughness with which he accomplishes it.

The diseases treated in this hospital are very similar to those listed as occurring in St. Vincent's Hospital, Kiukiang, except that there occurs no kala-azar or beriberi, and quite a number of teniasis cases come in.

The Church General (figs. 25 and 26) and the Elizabeth Bunn Memorial Hospitals (figs. 27 and 28), over in Wuchang, are practically one and the same institution, being representative of the work done by the American Protestant Episcopal Mission. They will, therefore, be considered together.

The establishment of hospital work in Wuchang was begun by Dr. Albert Bunn, who arrived on the field December 3, 1874. He

began the work first by opening a dispensary in the rear of the chapel on Fukiai Street, where three times a week he attended his patients. In the early part of 1876 a temporary hospital building, containing two rooms—one for patients and the other for the dispensary and operating room—was erected in the mission compound. In 1878 Dr. Bunn erected a Chinese building and opened a hospital for women and children. Thus began the Elizabeth Bunn Memorial Hospital. In 1879 Dr. Bunn was compelled to leave the mission on account of illness. In October, 1880, Dr. William A. Deas was appointed to succeed Dr. Bunn. The following year the foreign committee announced that funds had been raised for the erection of a suitable building as a proper memorial for Mrs. Bunn, and a plot of ground was purchased for its erection.

During the first year of the hospital service 10,999 cases were treated by Dr. Deas, who retired in 1888. In October, 1891, Dr. Edward M. Merrins, appointed missionary physician, arrived and opened the men's hospital, and in 1893, with a gift from home amounting to \$5,000, a new hospital was erected on a plot of ground adjoining the mission compound. Dr. Merrins continued the work at this, the St. Peter's Hospital, until 1896. He was succeeded by Dr. McKay, who died the day he was to take over the duties of the hospital. He was succeeded by Dr. William L. Ludlow, who was taken ill after his arrival and was compelled to return to America. In November, 1898, Dr. Robert Borland assumed charge of the work, but resigned in 1905 and was succeeded by John McWillie, M. D., C. M., who remains in charge to the present date. In 1907 the hospital had to be enlarged to accommodate the patients, and even with the addition hundreds had to be refused admission in the next year. In 1910 the hospital buildings were taken by Boone College and the hospital transferred to its present site, which was rented for one year, loaned by the Government for one and one-half years, and finally purchased in 1913.

The support comes partly from the Mission Board and the rest from local sources, such as fees of patients and special gifts and subscriptions. Wuchang is not an open port and the only foreigners permitted to reside in it are missionaries.

The hospital is about one-half mile from the Bund and that distance from the Chinese gunboat anchorage, but about 3 miles from the usual gunboat anchorage in Hankow. It is easily reached by rickshaw or on foot, and is located in about the geographical center of the city. The site is apparently healthy, but the place has not been occupied long enough for one to be dogmatic on that point.

The principal building of the Church General Hospital is of semi-Chinese style, built and occupied for many years by a Chinese family. For a Chinese house it is easily the best available in this city,

but is hardly up to that which is usually used as a barn in America. The floors are of lime concrete on the ground floor and rough planks on the second. There are four large wards with 13 beds each, three wards with from 3 to 4 beds each, two private wards with 1 bed each, and three private wards of 2 beds each. In all 70 patients can be accommodated. In addition to the main building there is an open one used for waiting patients of the clinic, besides dressing, consulting, and drug rooms. Kitchen and sleeping quarters for the nurses and servants are in other buildings. The average number of patients entering the hospital per month is 109, and the average number of patients attended to per month (includes clinic and out-calls) 2,500.

The women's department at the present moment is about one-half mile away and is only an old dilapidated Chinese dwelling, too damp and unhealthy for the foreign force to work in constantly. The intention is to move it up to the men's hospital site as soon as practicable, in which case patients will have to occupy Chinese one-story buildings, but on higher ground. If, however, the necessary repairs can be made, the buildings will be more healthy. The statistics are very meager for the women's department for the past year, as it has been without a woman doctor for all but a few months of the year, and was not even then carried on at full capacity.

Some of the diseases treated are: Tumors, malignant and benign, malaria, dysentery, diarrhea, typhoid, typhus fever, cholera, pneumonia, and mental diseases. The surgical work embraces practically three-fourths and venereal diseases about one-tenth of the whole.

Facilities for operative work are good, with a very serviceable operating room which is serviceably, but not at all elaborately, furnished. Up to date no infection has taken place in an abdominal operation. The purpose of the hospital is primarily to treat Chinese sick, but the hospital considers that it has a much larger opportunity and duty, and is planning for social work in connection with it, as soon as a new building is provided and a staff sufficient to oversee the work is secured. It is also undertaking the training of Chinese men and women in their respective departments to become nurses, and a school of over 20 is now in training. At present there is one special building which can accommodate a foreign patient, and it is planned to have at least three wards for foreigners in the new hospital.

The medical staff is as follows:

John McWillie, M. D., C. M., director, also graduate from Trinity University, Toronto, Canada, in 1900; entered the American Church Mission in 1903; and was at Anking for two years, where he organized the first ambulance corps in the Chinese Army in 1904. He has been in Wuchang since 1905, organizing the Boone Medical School in 1907.

Mary Latimer James, M. D., graduate of the Pennsylvania Women's Medical College; missionary of the Episcopal Church in Utah; physician in Peiyang Medical School and Hospital, Tientsin, 1912-13; appointed superintendent of the Women's Department, American Church Mission, in 1914.

C. M. Wassell, M. D., University of Arkansas, 1909; private practice for four years; appointed a medical missionary by the American Church Mission in Wuchang in 1914, placed in charge of the Boone Medical School and attached to the Church General Hospital.

The nursing staff of both men's and women's hospitals is made up of 4 American graduate nurses; 16 Chinese nurses, some graduates and others in training; 6 female nurses in training in the women's department.

Charges for Chinese are practically the same as in other native hospitals. Foreign patients are charged as arranged. Occasionally there is an extra charge for operations.

The director of the hospital was the organizer and president of the Wuchang and Hankow Red Cross associations at the time of the rebellion. The hospital received the first of the wounded and in all accommodated about 500 during the trouble in 1911. The whole staff, both medical and nursing, were engaged in the Red Cross work and have been duly honored and decorated for their services.

The next port of call for United States gunboats after leaving Hankow is Yochow City. This is not an open port, although a small town close by, called Chenling, is. Practically the only American interest in Yochow City is a mission of the Reformed Church in the United States and its little hospital, which is called the David Schneider Hoy Memorial Hospital. It was built under the supervision of Dr. J. Albert Beam during 1905 and was formally opened in the spring of 1906. A dispensary had been conducted by the doctor since 1903, before the hospital was built. For a short time in 1909 the hospital was closed, though dispensary work was carried on by Dr. William F. Adams, who succeeded Dr. Beam in 1909. Dr. Adams is a graduate of Toronto Medical School and a graduate dentist. Some time during 1911 Dr. Sung, a graduate of the Mission Medical College at Hankow, came to assist Dr. Adams, and after he left Dr. Hsiao, of the same school, succeeded him as assistant. The source of support of the hospital is partly from the mission board and partly from fees of patients.

The hospital can be seen from the river front just behind the pagoda. It is situated on a fairly high spot, free from any particularly offensive odor, and in a fairly open space. It is easily accessible from the gunboat anchorage, being but two minutes' walk from the river.

The building is at present L shaped, being an unfinished U, one arm of the U having been intended for the women's wing, which has not yet been built. It is two stories high, with verandas on the east, south, and west sides. The floors are of Oregon pine, the ceilings about 14 feet high downstairs and perhaps a foot lower upstairs. The entire structure is of brick. There are four general wards, storeroom for bedding and linen, storeroom for drugs, and an office downstairs; two private and semiprivate rooms on the second floor, which are used for foreigners, the operating room, and a room formerly used to keep instruments in. The operating room is not very well equipped, owing to the absence of Miss Traub, the nurse, who is on furlough in the United States. At present the hospital will accommodate 50 patients. The front is about 50 feet wide and the side about 80 feet long, exclusive of the verandas. A hall connects with all rooms of the hospital. The yard has been walled off from the rest of the compound. It is approximately 90 feet wide and 125 feet deep. It stands about 10 feet from the city wall. The kitchen is located slightly to the rear of the hospital, directly back of what would be the hollow of the U. There are no quarters for contagious cases because of the lack of funds to fit out existing buildings. The hospital is hardly suitable for foreigners, except in a pinch. The place is heated by stoves, lighted by lamps, and there is no running water.

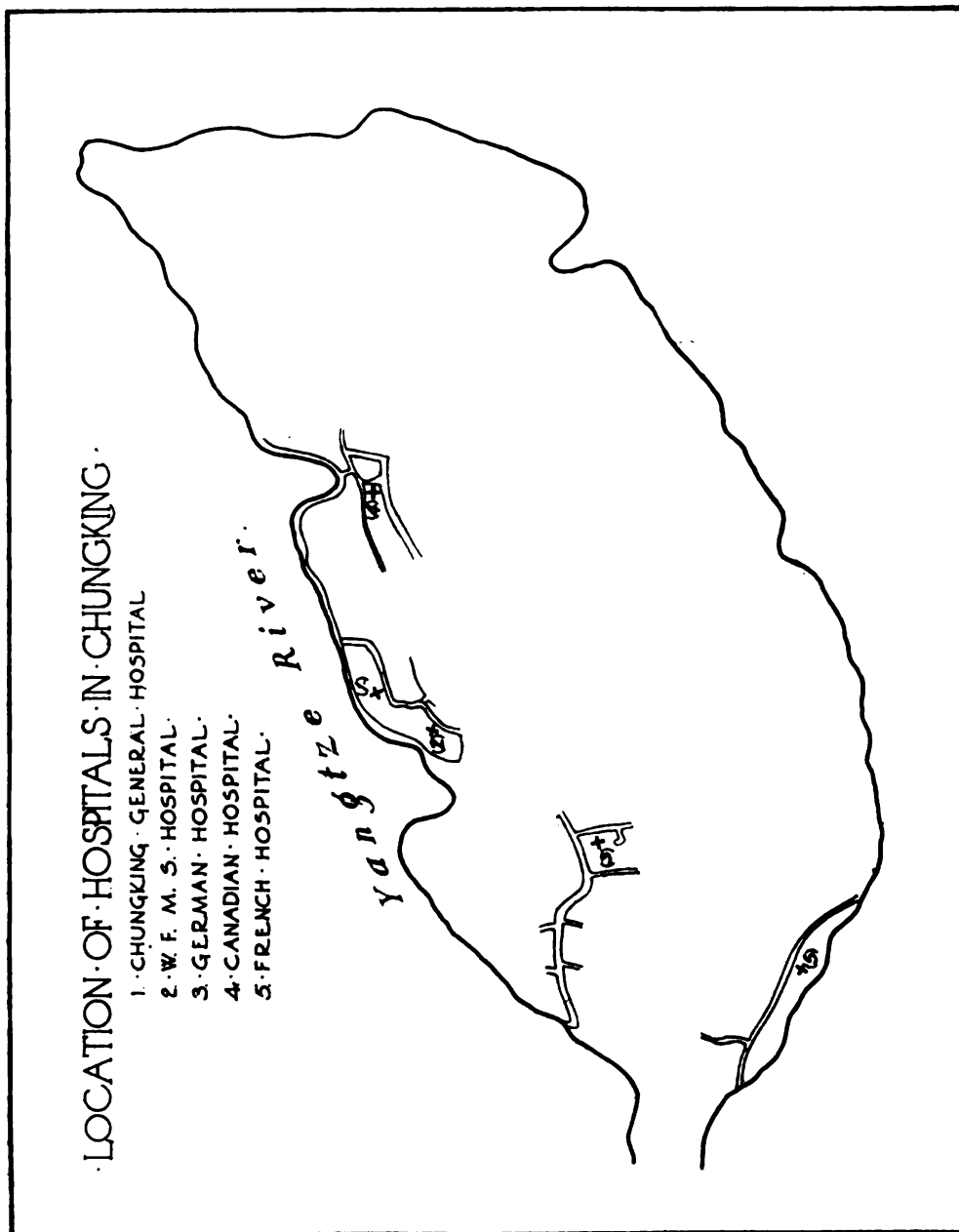
The nursing staff consists of Miss Alice E. Traub, graduate of Hahnemann Hospital, and eight Chinese men in training, some of whom have had more than three years' experience. The hospital is always crowded to the limit, and on alternate days an average of 150 people are treated.

In case of dire need, naval cases could be sent to the hospital and they would be received by the hospital authorities.

When gunboats go farther inland than Yöchow they proceed in either of two directions—to Changsha through the Tungting Lake or up to Ichang and Chungking. As I have never been to Ichang or Chungking, I can not write from a personal acquaintance with the medical institutions in these places. I am informed, however, by Asst. Surg. R. G. Davis, of the U. S. S. *Elcano*, that in Ichang there is one small hospital of 65 beds for Chinese, run by a Scotch doctor and nurse. It is located on the Bund, but is hardly suitable for the treatment of foreigners, although in necessity they could be accommodated in a few private rooms used for better-class Chinese. Owing to the large amount of medical work done and to lack of funds, Dr. Bostwick and his nurse have difficulty in keeping the place up to the usual standard of repair and cleanliness. The institution is supported by contributions from Scotland and by local friends and patients' fees. Quite a considerable amount of surgery

is said to be done here, such as bone work, tubercular glands, fistulas, hernias, etc., in spite of the fact that facilities for doing the work are limited.

From the American consul in Chungking I learn that there are five hospitals in that place, located as seen in the accompanying rough



sketch of the town. As the French hospital is practically shut down, owing to the departure of the physician, Dr. Charles Trividic, and owing to the small size of the Canadian hospital and the small amount of work done by it, and because I have been unable to obtain much information concerning them, only the other three will be considered in this article.

The official name of the German hospital is the German Polyclinic for Chinese. It was founded in 1906 by the German Government, and is run by the German foreign office, under the direct charge of Dr. Assmy, a surgeon-major in the German Army. The institution is centrally located in the Chinese city and housed in a Chinese building with 2 floors, 8 wards, and 26 beds. The hospital treats between 450 and 500 in-patients during the year and nearly 5,000 out-patients, with 16,820 calls. Foreigners are treated as out-patients only. The hospital is equipped with an operating room with good facilities and a laboratory for bacteriological investigations. There is no X-ray machine.

Dr. Assmy is the only physician attached to the place. The nursing staff consists of one hospital steward of the German Navy, three nurses as assistants, six coolies, and other employees.

Poor patients are taken in free, others pay 4,000 cash a month for food, while better situated patients pay up to \$15 Mexican a month.

The Chungking Men's Hospital was founded in 1891 by the American Methodist Episcopal Mission, with Dr. J. H. McCartney in charge. It is supported from mission funds and from such contributions as patients' fees and gifts from local friends and from home. The building is of brick, 136 by 55 feet, with eight verandas and three stories. Two-thirds of the ground place has a basement. The hospital has 8 wards, 38 rooms, and 85 beds, and the average number of patients accommodated at one time is 60. The operating facilities are fairly good, although a new operating suite is needed. Three of the private rooms are for foreigners, although it is a missionary hospital meant primarily for the Chinese.

The physician in charge, and the only one attached, is Dr. C. W. Freeman; under him are eight Chinese nurses.

The fees are as follows:

- Public ward, \$2 Mexican per month.
- Semiprivate, \$0.20 Mexican per day.
- Private, \$0.70 and \$1 Mexican per day.
- Foreigners, \$3 to \$5 Mexican per day.

During the recent troubles this was the local Red Cross hospital, and a large number of wounded men were treated here. Naval sick can be sent to this institution, and it is the only one in Chungking where they could be accommodated.

The William Gamble Memorial Hospital for Women and Children was founded by Mrs. Francesca Gamble in memory of her husband in 1902. It is a missionary institution and is supported partly by the mission and partly from patients' fees and local authorities. The hospital is on an easily accessible business street and in a healthful location overlooking the river and a large stretch of country. The building is of brick with 3 floors, 4 wards, 10 rooms, and 62 beds

in all. The average number of patients in the hospital at one time is 60, and the in and out-patients together average 2,253 cases per month. The institution boasts a well-equipped operating room, but poor facilities for the care of contagious cases. It is for Chinese only, and there are no facilities for treating foreigners.

Dr. Agnes M. Edwards, graduate of Northwestern University Medical School, is in charge of the hospital, and at present the only physician attached to it. There is one graduate American nurse, with 10 native girls in training.

The fees charged are from nothing to a few cents a day in the wards, and in private rooms from \$5 Mexican per month to \$1.50 Mexican per day.

In Changsha there are three hospitals; two of these, the Changsha Yale Hospital and the Hunan Red Cross Hospital, are run by the same staff of physicians and nurses. The other is an institution consisting of a hospital and dispensary for Chinese women under the auspices of the Norwegian Missionary Society and run by Dr. Ragnhild G. Gotteberg, a Norwegian physician who speaks English very well.

The medical staff of the Changsha Yale Hospital and the Hunan Red Cross Hospital is as follows:

Physicians: Edward H. Hume, B. A., Yale, 1897; M. D., Johns Hopkins, 1901; house surgeon, Johns Hopkins Hospital, 1902-3; acting assistant surgeon Public Health Service, Bombay, 1903-1905; physician in charge Yale Hospital, Changsha, 1905-1914. Alfred C. Reed, B. A., Pomona College, 1907; M. D., Bellevue, 1911; instructor in pharmacology, Bellevue, 1911-12; assistant surgeon Public Health Service, 1912-13; assistant physician, Yale Hospital, 1913-14.

Surgeons: F. C. Yen, B. A., St. John's College, 1904; physician in mines, South Africa, 1904-5; M. D., Yale, 1909; D. T. M., Liverpool, 1909; physician in charge, Red Cross Hospital, Changsha, 1911-1914; associate physician in charge Yale Hospital, 1911-1914. T. M. Li, B. A., St. John's College, 1904; M. D., University of Pennsylvania, 1909; associate physician, University Medical School, Canton, 1909-1913; associate physician in charge Red Cross Hospital, Changsha, 1913-14.

The nursing staff of these institutions is as follows:

Foreign nurses: Nina D. Gage, B. A., Wellesley, 1905; Roosevelt Hospital Training School, 1908, R. N.; nurse in charge of Yale Hospital, 1910-1914; Dean Siangya Training School for Nurses, 1913-14. Beatrice Farnsworth, Johns Hopkins Hospital Training School, 1911, R. N.; supervising nurse Yale Hospital, 1913-14.

Under these nurses are Chinese girls in training at the Yale Hospital and male dressers at the Red Cross Hospital, the latter belonging to the Siangya Nursing School.

The fees charged patients in both hospitals are as follows:

Public wards, Chinese, \$0.20 Mexican daily.

Private wards, Chinese, \$0.50 Mexican daily.

Private wards, foreign women (Yale Hospital), \$4 Mexican daily by special arrangement.

The Changsha Yale Hospital was opened in 1907 by the Yale Foreign Missionary Society, New Haven, Conn. Two-thirds of the support of the hospital comes from fees, etc., received locally and one-third from subscriptions in the United States. It is located on Hsi Pai Lou, in the midst of the Chinese city, about six minutes' walk from the Custom's Bund. It is on an important well-drained street and in a healthful locality as far as Chinese cities allow. The hospital is built of brick and wood, being a modified Chinese house. It is used at present only for women and children, while the Red Cross Hospital is used for men. The building is 200 feet by 50 feet. It has 37 beds for Chinese women and children divided into public and private wards. There is one bed and at most two available in emergency for foreign women. The hospital is always full of patients. There were nearly 400 in-patients last year with an average stay of 21.6 days in the wards, and 15,500 out-patients in the dispensary.

Every variety of disease is treated, including those of temperate and tropical zones, excepting that contagious sick are taken only in case of emergency. Considering that the hospital is a transformed Chinese house, it has a fairly good operating room with abundant surgical equipment including a steam pressure sterilizer.

The hospital is planned to be the foundation of a modern medical school. The plan for such a school in cooperation with the Chinese is well along. In general, the present building is not adapted to the care of foreigners, but two women could be looked after in a pinch. A new hospital is to be built almost immediately outside the north gate of the city, 25 minutes' walk from the Custom's Bund, on one of the largest sites in the vicinity, providing for 114 Chinese and six foreign patients. The hospital will cost about \$200,000 gold, and will be up to date in every respect. There will be city dispensaries in addition.

At the time of the revolution in 1911, the Red Cross work for this district was centered at the Yale Hospital under Dr. F. C. Yen. He also helped to organize the hospital of the Red Cross Society because the accommodations at the Yale Hospital, which at that time accepted men as well as women patients, were inadequate for the needs of the occasion. The appointees of this hospital rendered constant public service in 1911 and again in 1913, at the time of the revolution.

The Hunan Red Cross Hospital was opened in 1911 by the local Red Cross Society which has since been incorporated with the China

Red Cross Society. The support comes entirely from local sources, from monthly subsidy by the local Government, subscriptions and fees. The hospital is located in Tung Ma Hong, very nearly in the center of the city, with the front entrance facing the residential section of the city and the rear entrance opening on an important business street.

It is in a clean and healthy section of the city, about 10 minutes' walk from the Bund. The hospital itself is quite spacious, with plenty of open courts, and is well supplied with drains.

The building is a typical Chinese yamen, having five rows of buildings arranged parallel with each other and with open courtyards between each row. Each row of buildings has four rooms, with a wide central passage. It also has a west wing with a garden in front. All buildings, with the exception of one two-storied house, are of the bungalow style. There are four general wards with 56 beds, three semiprivate wards with 24 beds, and six private wards with 9 beds, making a total accommodation for 89 patients. No reservation is made for foreign patients, but arrangements can easily be made to accommodate them on a short notice. The hospital is always full, the average number of in-patients being 75 and that of out-patients 180 per clinic. Cases of contagious diseases are not admitted. Cases of infections by the hookworm and *Schistosomum japonicum* are frequently observed. There is abundant material for operative work and the facilities for it are fair.

The hospital was organized in 1911, primarily for the care of wounded soldiers. When the revolution was over the committee thought it wise to use the surplus funds to start a hospital for the benefit of the sick in this city, and to-day, although the name is retained, it is actually doing the work of a city general hospital. The society owns a lot of good land outside the north gate, given by the local government, and as soon as money is forthcoming it is hoped to build on it a new hospital. During the revolution of 1911 arrangements were made with the Red Cross workers in Hunan to send up to this hospital wounded Hunan soldiers who were able to take the trip. In that way some 400 soldiers were treated in the hospital. Again, in the rebellion of 1913 a first-aid corps was sent to Yochow to be ready to take care of the wounded there.

All preparations have now been completed to open an isolation hospital in the city early in the fall. This hospital is to be opened under the auspices of the police department, but under the control of a medical committee, on which the majority are members of the Yale and Red Cross staff.

The Red Cross Hospital, though not very suitable for the treatment of naval sick, can be used for the purpose in a pinch, and many

foreign sailors and merchantmen have been accommodated, as this is the only place in Changsha where naval sick can be sent.

The Yale and Red Cross Hospitals furnish a large amount of clinical material, which is always at the disposal of naval surgeons. In addition, the projected new hospital will offer first-class facilities for treatment of naval sick.

I hereby wish to express thanks to all the doctors on the river who have been so kind in helping me with reports of their institutions, and to Asst. Surg. N. R. Sullivan, United States Navy, for obtaining some of the information and photographs. I am also indebted to Hospital Apprentice, first class, C. B. Selden, United States Navy, of the U. S. S. *Saratoga*, for the clerical work done, and to Hospital Apprentice, first class, J. L. R. Vance, United States Navy, of the *Saratoga*, for copies of two sketches.

SOME MEDICAL ASPECTS OF THE UPPER YANGTZE RIVER COUNTRY.¹

By D. C. POST, Assistant Surgeon, United States Navy.

Having the fortune to have been the first medical officer of the United States Navy to see service above the gorges of the Yangtze, I deem it probable that a brief survey of the medical features observed there may be of passing interest.

Below the river port of Ichang, Hupeh Province, the country is familiar to many naval officers, but for the gunboats heretofore owned by the American Navy the river is navigable only thus far. The *Palos* and *Monocacy* being especially constructed for this work, the former was ordered to make the initial trip to Chungking, leaving August 21, 1914.

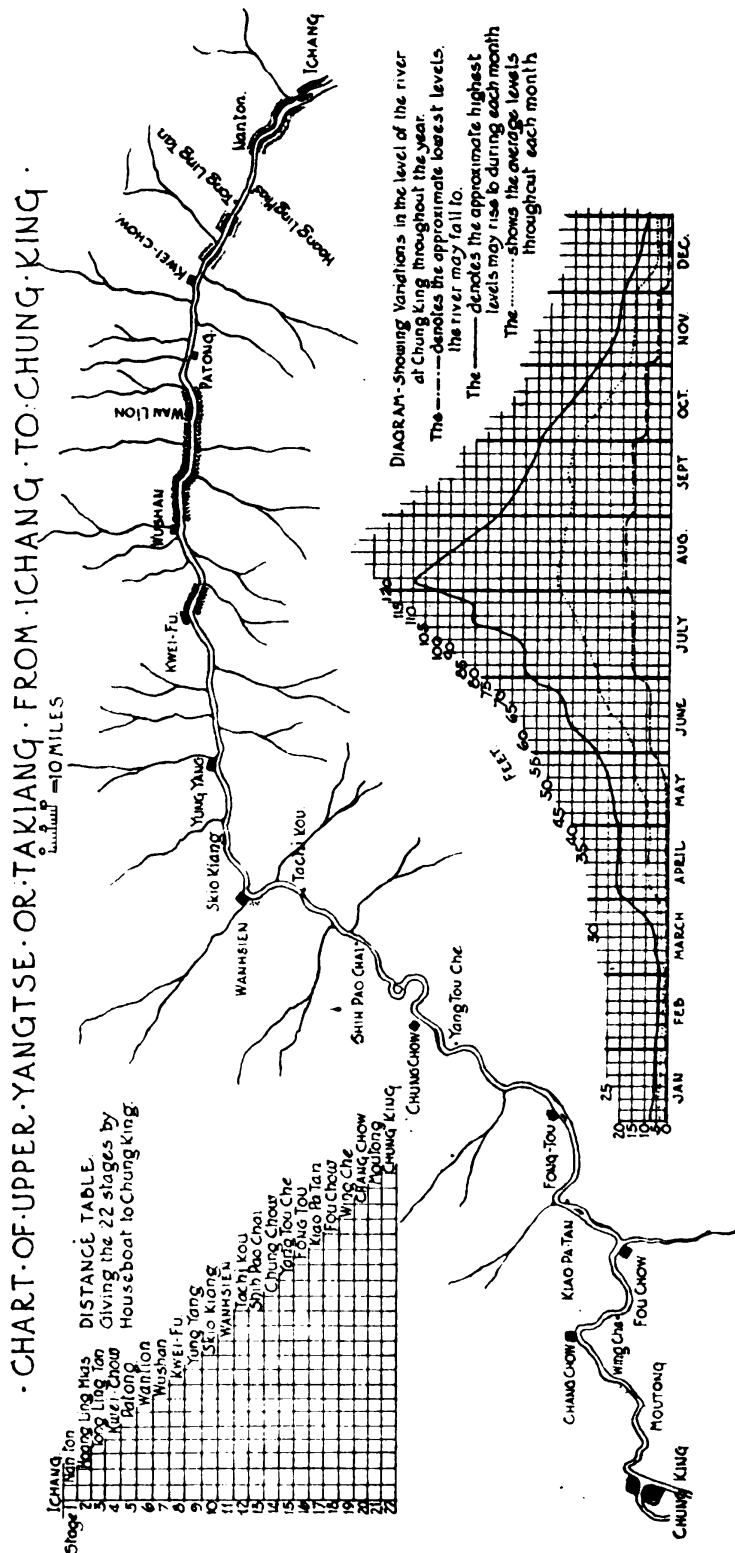
Plying between Ichang and Chungking are three merchant steamers—the S. S. *Da Chuen*, S. S. *Shu Hun*, and S. S. *Shu Tung*—of the China Navigation Co. The charges for transportation are \$80 local currency for passage up the river to Chungking and \$40 for the trip down to Ichang. Baggage is extra at about \$3 per hundredweight. The *Shu Hun* is the largest and most desirable, being quite a comfortable ship.

A new steamer has been placed in commission for commerce between Chungking and Suifu. Movement is on foot for more steamers on each of these runs just mentioned.

After seven days of steaming against a current averaging $6\frac{1}{2}$ knots for the whole distance, the *Palos* arrived in Chungking. In some of the rapids the current flowed at a rate of something more than 12 knots per hour.

¹ Received for publication Jan. 4, 1915.

The ports between Ichang and Chungking gave little information, as we stopped only for the night or to take on coal, to be again



underway at 6 o'clock next morning. Arriving at Chungking August 28, 1914, the *Palos* dropped anchor in the main river with the Ameri-

can consulate in the distance on her starboard beam. Water level of river was 66 feet above low-water level.

On September 14, 1914, the rapid fall in the river level made it necessary to shift anchorage. This part of the river is very treacherous, and frequent use of the motor boat, essential to proper administration of ship affairs, is rendered hazardous from any anchorage in the main river, all anchorages being across the river from the city. So the *Palos* moved downstream to the mouth of the Kiating River, which, as it joins the main river, makes a promontory of rock, whose mean breadth is 1 mile, on which the city is situated. Here was found a very suitable anchorage.

Facing up the Kiating River on the right, opposite Chungking, is the small town of Kiangpeiting.

The surrounding country is thickly studded with hills varying in height up to 1,500 feet and extensively terraced and cultivated into rice paddies.

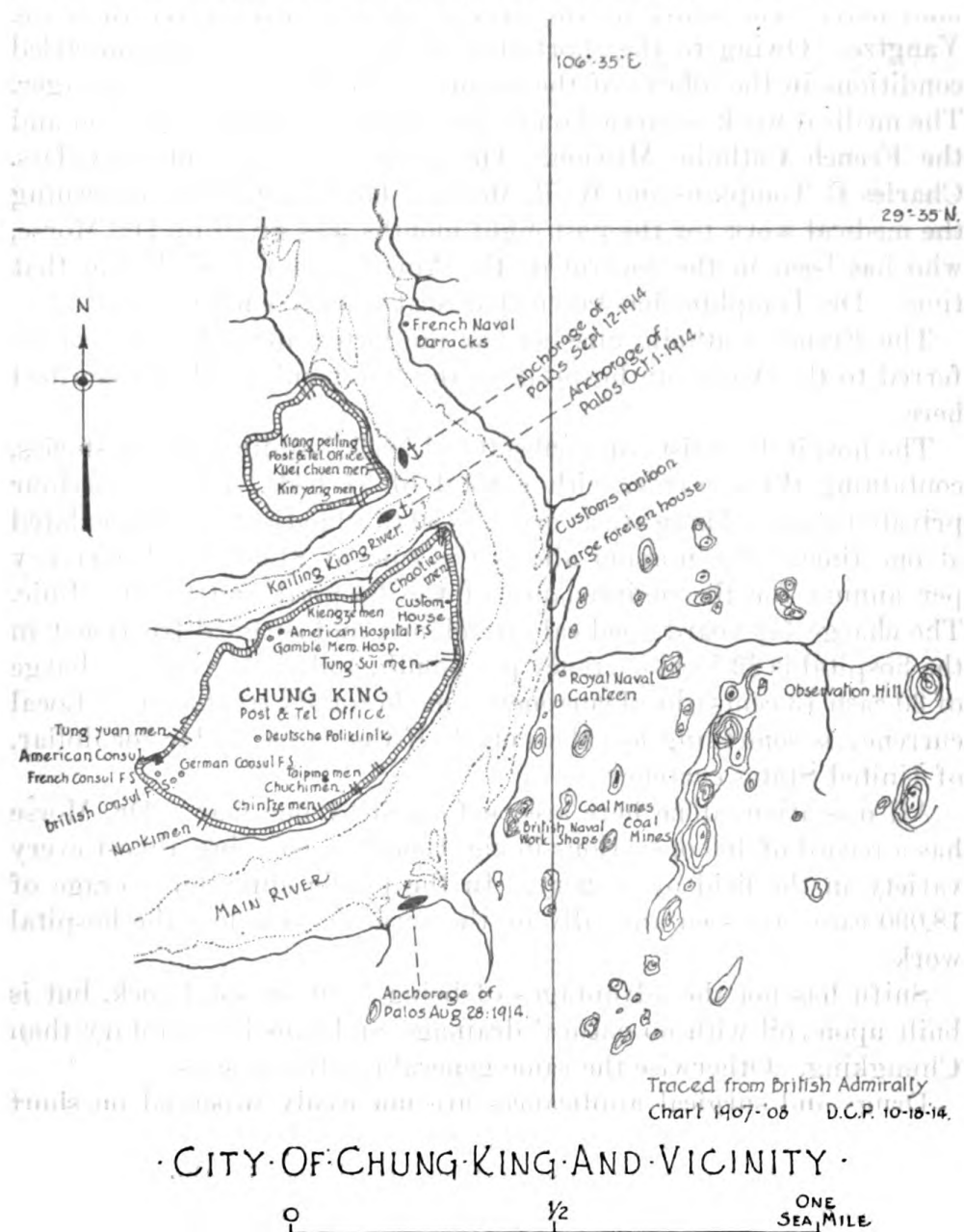
The climate is very mild the year round, the temperature never reaching the freezing point, and, indeed, in the summer months the foreign population repair to their bungalows in the hills because of the unbearable heat. The summer temperature averages about 102° in the shade.

Chungking is built almost entirely upon solid rock and is surrounded completely by a wall of the conventional Chinese type. This solid rock is one very important sanitary feature of the town, as all the rains are quickly drained off. In the summer months a large amount of refuse collects in and around the thickly huddled houses. The city contains approximately 450,000 people and is limited by the wall to an area of 1 square mile. Thus an idea can be gained of how difficult sanitation is here. However, the rains, which are sometimes very copious, do a great deal to clear the city of its refuse, and the gates being the main points of egress for the water, veritable torrents are seen to issue therefrom, sometimes so strong, it is reported, as to sweep small children from their feet and down into the river. This water is sometimes black from being laden with all sorts of refuse which has been trodden to dust.

There is some attempt at the construction of gutters. These gutters are covered over in places in the rock, but they fill up with refuse during the dry weather. The streets are so narrow as to allow no more than two sedan chairs, which are about 28 inches wide, to pass abreast.

The water supply comes entirely from the river, with the exception of periodical streamlets draining the graveyards on the hills outside the wall. This water is made potable to the Chinese by sedimentation and filtration through charcoal and sand. It is very common to see the lower classes drink directly from the river.

The refuse is disposed of after a fashion by buckets on either end of a stick of bamboo, and the air in the city proper is laden with fecal odors. This is true of every town visited by the *Palos*.



CITY OF CHUNG KING AND VICINITY

The presence of swine, ducks, and chickens in the dwelling spaces of the lower classes is another factor increasing the accumulation of refuse.

Helminthiasis is very prevalent of course. I am confident that every individual harbors some variety of intestinal parasite.

On September 23, 1914, the *Palos* left Chungking for Suifu, arriving on September 27, 1914. Suifu lies at the mouth of the Min

River; our anchorage was in the Min River. It is a city of 200,000 inhabitants, covering approximately 1 square mile of land. The surrounding country is hilly as at Chungking, but there is more low land here. The water of the Min River is much clearer than the Yangtze. Owing to the short stay of the *Palos* and the unsettled conditions in the affairs of the country, statistics were very meager. The medical work is carried on by the American Baptist Mission and the French Catholic Mission. The former is represented by Drs. Charles E. Tompkins and W. R. Morse. The information concerning the medical work for the past eight months was given by Dr. Morse, who has been in the control of the American hospital during that time. Dr. Tompkins has taken charge at the present time.

The French Catholic mission has no doctor and all cases are referred to the American hospital, so the latter only will be described here.

The hospital consists of a substantial brick building of two stories, containing three wards, with a total of 27 beds. There are four private rooms. There are as many as 50 to 80 patients accommodated at one time. The mission allows the sum of \$1,000 local currency per annum for the maintenance of the hospital and public clinic. The charge for board, medical attendance, and surgical treatment in the hospital is \$2 local currency per month, and in the clinic a charge of 30 cash (3 cents) local currency is made for six treatments. Local currency is something less than one-half the value, dollar for dollar, of United States currency.

All operations done here are performed by one man. Dr. Morse has a record of 400 operations in eight months, covering almost every variety in the field of surgery. In the public clinic an average of 18,000 cases are seen annually by the surgeon who does the hospital work.

Suifu has not the advantages of being built on solid rock, but is built upon soil with no natural drainage, and thus less sanitary than Chungking. Otherwise the same general conditions exist.

Drugs and surgical appliances are not easily procured on short notice and are costly in this section of the country.

There is, of course, no time and less facilities for the surgeon to make laboratory diagnoses. Lack of men to do the work is the first great hardship; second, lack of money.

With the amount of work to be done the best sanitary features of a hospital are of necessity lacking, but in spite of this fact a vast amount of relief is rendered the public.

In Chungking the one hospital which is able to receive and care for men of the American Navy is the Chungking General Hospital, of which Dr. C. W. Freeman is the director. The charge is a flat rate of 2 taels per day for enlisted men.

The only clinic where laboratory diagnosis is made is the Deutsche Poliklinik. Through the kindness of Dr. Paul Frederick Assmy I am able to give a brief idea of the status of the diseases of this district.

RÉSUMÉ OF ONE CALENDAR YEAR IN THE DEUTSCHE POLIKLINIK, BEGINNING AUGUST 1, 1913, TO JULY 31, 1914.

From a total of 4,787 cases, with 16,820 consultations, the following facts have been derived. Inasmuch as to the naval medical officer a detailed account of all minor ailments is not of strictest import, only those which are considered of importance to the naval personnel are here set down.

INFECTIOUS DISEASES.

Typhoid: Nine cases. All proved by Widal and blood cultures. It is interesting to note that four of these cases were of the British Navy on board *H. M. S. Widgeon* and *Teal*. These men had not had the typhoid prophylaxis. It has not been adopted in the British Navy as yet.

Dysentery: Fifty-six cases. Of the 56 cases, 38 were amebic, as shown by microscopical findings. The remaining 18 were divided between bacillary dysentery and that due to the flagellates. The occurrence of the above cases of amebic dysentery are tabulated as follows:

August.....	6	February.....	4
September.....	8	March.....	6
October.....	4	April.....	0
November.....	3	May.....	2
December.....	0	June.....	4
January.....	0	July.....	1

September is usually the month in which most of the cases occur. The number depends largely on the rise and fall of the river level. During a fall of the water level the breeding of flies is augmented, and this coincides with the increase of cases. In this city the spread of the disease is believed to be due to flies, because it occurs among foreigners, who are very particular about their drinking water and who always filter and boil it.

Malaria: Thirty cases. Of these 26 were tertian and 4 were estivo-autumnal. No cases of quartan received. The occurrence of these are as follows:

Tertian.

August.....	5	February.....	0
September.....	1	March.....	0
October.....	0	April.....	4
November.....	0	May.....	4
December.....	0	June.....	6
January.....	0	July.....	6

Estivo-autumnal.

August-----	0	February-----	0
September-----	1	March-----	0
October-----	0	April-----	0
November-----	2	May-----	0
December-----	1	June-----	0
January-----	0	July-----	0

Relapsing fever: Seven cases. Believed to be due to the harboring of the spirochete by bedbugs and lice. Patients were mostly those who live in river boats and cheap hostelrys.

Cerebrospinal meningitis: Two cases.

Tetanus: Two cases (fatal).

Mumps: Nine cases.

Pneumonia: One case. A distinctly rare disease. Diseases of the throat are rare among Chinese, believed to be due to the fact that they wear no clothing about the neck.

Rheumatism: One hundred and fifty-six cases. Of 156 cases, 21 were acute arthritis and 1 a case of peliosis rheumatica. The acute stages are comparatively rare.

Beriberi: Three cases.

Unclassified fevers: Thirty-five cases. Characterized along the river as Ichang fever, Chungking fever, etc.; etiology not yet definitely settled.

Smallpox and all exanthemata are so common and numerous that hospital treatment is never sought. Ambulant cases can be seen at any time in the streets.

Tumors of the spleen of unknown origin: Seven cases. The etiological factor is thought to lie between kala-azar and Banti's disease. Common symptoms and findings are: Polycythemia, anemia; complications by infection with *ancylostoma* makes diagnosis difficult. Cultures from blood and splenic puncture have been unsuccessful, negative for kala-azar and *schistosoma*. Emaciation, with ascites, always present. Malaria, typhoid, heart disease, and syphilis have been ruled out as causes.

Leprosy: Four cases. Anesthetic type, 1; tuberculous type, 3.

Bronchitis: One hundred and fifty-two cases. Promiscuous expectoration constitutes one of the greatest faults of the Chinese. Bronchitis and tuberculosis are to be expected.

Pleurisy: This is as distinctly rare as pneumonia. Two cases in a year.

Endocarditis due to rheumatism: Three cases. This corresponds to the comparative rarity of acute arthritis.

Varix: Seven cases. Very common among coolies. Only 7 cases came to this hospital.

Aneurysm: One case. Popliteal.

Elephantiasis: One case, due to chronic infection of a streptococcus. Three cases unknown origin. No filariae found. One case had 25 per cent eosinophiles, with no helminths.

Pyorrhea alveolaris has been found to be very common among the masses. Care of teeth is unknown. It is suggested as the cause of the rheumatism here.

Angina: Eleven cases (nonspecific).

Helminthiasis: In 752 examinations the following findings are given:

<i>Ascaris</i> (alone).....	85
<i>Ascaris</i> and <i>Trichocephalis trichiurus</i>	20
<i>Ascaris</i> and <i>Ancylostoma duodenale</i>	49
<i>Ascaris</i> and <i>Trichocephalis trichiurus</i> and <i>Ancylostoma duodenale</i>	36
<i>Trichocephalis trichiurus</i> and <i>Ancylostoma duodenale</i>	7
<i>Opisthorcis sinensis</i> and <i>Ancylostoma duodenale</i>	1
<i>Trichocephalis trichiurus</i> (alone).....	3
<i>Ancylostoma duodenale</i> (alone).....	16
<i>Oxyuris vermicularis</i> (alone).....	1
<i>Strongylus stercoralis</i>	4
Flagellates:	
<i>Cercomonas intestinalis</i>	10
<i>Trichomonas vaginalis</i>	3
<i>Lambliia intestinalis</i>	2

Schistosomiasis: This has not been seen above the gorges of the Yangtze by Dr. Assmy.¹

Unfortunately the exact number of cases covered by the above examinations is not known, and thus much of the value of the tabulation is destroyed. However, from these cases it has been found that in 109 ancylostoma infections only three cases were in females (children). Port of entrance seems to be through skin of feet. Women bind their feet and thus do not expose them. The disease is universal among trackers, water coolies, and laborers, who go about barefooted. Going on shore barefooted, as men of the deck force of our gunboats are apt to do in warm weather, should be prohibited.

VENEREAL DISEASES.

Gonorrhea: Males, 149; females, 27.

Very few women come to this clinic with venereal diseases. I am told by Dr. Edmunds, of the Gamble Memorial Hospital of this city, that gonorrhea and syphilis are very common among her patients, who are all females.

Strictures and complications are comparatively rare.

Epididymitis, 21 cases.

Strictures, no cases.

¹ See article by the same author on p. 645 of this issue.—Ed.

Gonorrheal rheumatism, 5 cases.

Gonorrheal conjunctivitis, 7 cases. The rarity of gonorrheal conjunctivitis is singular when one bears in mind the carelessness of the Chinese in their personal hygiene.

Chancroid, 161 cases. Bubo common.

Syphilis, 521 cases. Tertiary, 32; congenital, 30; primary and secondary, 459.

Chancroid and syphilis complicated by bubo, 77; phimosis, 67.

DISEASES OF THE EYE.

Blepharitis, 4 cases.

Hordeolum, 1 case.

Chalazion, 2 cases.

Conjunctivitis leprosa, 1 case.

Conjunctivitis simplex, 21 cases.

Conjunctivitis follicularis, 41 cases.

Conjunctivitis chronic, 18 cases.

Conjunctivitis gonorrheal, 7 cases.

Conjunctivitis phlyctenular, 22 cases.

Conjunctivitis trachomatosa, 115 cases.

The above includes all cases of pannus, pterygium, entropion, ectropion, trichiasis, and corneal ulcer of trachomatous etiology.

Conjunctivitis and diseases of adnexa: Pterygium, 5 cases; dacryocystitis, 5 cases.

Diseases of cornea (excluding trachoma): Ulcer of cornea, 7 cases; macula, 3 cases; leukoma, 8 cases; keratoconus, 4 cases; syphilitic keratitis, parenchymatous, 1 case.

DISEASES OF THE EAR.

Otitis media (mostly tuberculous), 78 cases. In these were found suppuration of middle ear, necrosis of ossicles and mastoid, without a case of meningitis or brain abscess.

DISEASES OF THE SKIN.

Scabies, 578 cases.

Pediculosis pubis, 2 cases (rare).

Ringworm due to *Trichophyton superficialis*, 78 cases; *Trichophyton profunda*, 10 cases; *Microsporon capellitis*, 88 cases, children.

Favus scutularis, 11 cases.

Tinea imbricata, 3 cases.

Pityriasis versicolor, 2 cases.

Psoriasis, 1 case (rare).

Seborrhea capitis, 5 cases.

Lichen ruber, 11 cases.

Acne vulgaris, 7 cases.

Rosacea facies, 6 cases.

Molluscum contagiosum, 1 case.

Folliculitis, 5 cases.

Furunculosis, 12 cases.

Impetigo. 183 cases.

Frostbite with temperature never down to zero centigrade has occurred, 12 cases coming to this clinic. A pronounced anemic condition was found in all cases.

Ulcers, 179 cases, with 170 examinations, exclusive of venereal, tuberculosis, and leprosy. Simple infected wound, 137 cases; varicose ulcer of leg, 21 cases; *ulcus tropicum*, 21 cases.

In the last named Vincent's symbiosis was demonstrated. The intravenous injection of salvarsan clears them up very quickly.

The investigations of Surg. C. S. Butler, United States Navy, and others make one hesitate in giving the importance to Vincent's symbiosis as a diagnostic feature of these ulcers, as he finds them in some cases of syphilis, chancroid, and phimosis due to various causes. That this symbiosis of spirochetes and fusiform bacilli is but surface contamination in Vincent's angina, *cancrum oris*, and tropical ulcer, or that the real etiological factor merely causes tissue changes which form a suitable culture media for this symbiosis, is, perhaps, not improbable.

TUBERCULOSIS.

Tuberculosis, pulmonary, 104 cases.

Of the skin, 84 cases.

Of the mucous and serous membranes: *Conjunctivitis*, 2 cases; *laryngitis*, 4 cases; *peritonitis*, 7 cases.

Abscess, without demonstrable connection with bones, glands, or joints, 21 cases.

Tuberculosis of organs: Testicle, 9 cases; mamma, 1 case; glands, 103 cases.

Vertebrae (most common site), 20 cases.

Joints: Elbow, 10 cases; knee, 10 cases; hip, 7 cases.

Sir Nathan Raw holds the view that pulmonary tuberculosis and laryngeal tuberculosis are caused by the human bacillus and that tuberculosis of joints, bones, and glands is caused by the bovine bacillus. From Assmy's cases, here given, the question arises, Why, if such be the case, is there such prevalence of gland, joint, and bone tuberculosis in the Chinese of this district, among whom the use of cow's milk is practically nil?

SOME MEDICAL CONDITIONS IN CHINA.

By R. G. DAVIS, Passed Assistant Surgeon, United States Navy.

The duties of a naval surgeon on the Yangtze River keep him in more or less constant contact with the medical missionary applying the elements of western medicine to an endless chain of clinical material, and an excellent opportunity is afforded for observing and studying his cases, their great variety, his mode of treatment and results in contrast to the simple ideas and crude methods employed by the native practitioner met in the interior.

The missionary is greatly handicapped in his work from the lack of competent assistants and modern facilities. Usually one doctor and a nurse are in charge of a hospital and an out-patient dispensary, seeing and trying to care for a large number of patients each day, making careful use of the microscope and routine laboratory examinations an almost impossibility; and in most cases only the most perfunctory examinations are made. In a few places, as Changsha, quality of work and not quantity is aimed for, and a high grade of technic is being carried out with the assistance of native doctors, foreign trained. Everywhere the greatest courtesy is extended, and both the medical and surgical wards are thrown open to us for any assistance or study, and through these courtesies I am indebted for the following notes.

Nearly every port from Shanghai to Chunking—a distance of 1,500 miles—contains some sort of a hospital or dispensary upon which the gunboat cases are dependent for urgent treatment. Several of these and the majority of those inland are converted Chinese houses made of stone, with few windows, without floors, and located in congested districts, rendering them dark, damp, and unventilated places. They have been modernized as far as available funds will permit, but much is left to be desired, as all are taxed far beyond their capacity, with only native trained nurses and coolies in attendance, whose ideas of hygiene are naturally primitive.

When we think of the extensive facilities and amount of energy put forth in the United States for 90,000,000 of people we get some idea of the needs in China, with a population of 400,000,000, where only a few Government hospitals exist. A short time ago the calls of a million people in one district met with no response, and it was only with the advent of the medical missionary that any intelligent service was rendered.

Chronicity is, unfortunately for the patient, true of most of the cases, as the aid of the foreign doctor is only sought long after the native remedies have aggravated the affliction. But fear and superstition are rapidly being overcome, and hundreds may be seen awaiting their turns in the various clinics.

China has been called "the land of tumors," as the cosmetic aspect is *nil*, and it is not uncommon to see the most disfiguring lipomas and sarcomas being carried around until pain or great inconvenience sends the host in quest of treatment.

The opium habit is met with in all classes and is considered the major vice. The drug is liberally supplied by native practitioners as a panacea for all ills, even to lulling the fretful baby to sleep with the pipe smoke, which is the favorite form of use. The habit has been quite universal in official life until recently, when the Government passed stringent laws prohibiting the use of the drug and the cultivation of the poppy. The average amount per habitué each day has been estimated at 105 grains. At the present time a wave of crime, attributed to the use of the drug, is sweeping Shanghai.

Eye diseases are common and are greatly aggravated from neglect. They are readily seen to predominate in the operative cases, especially entropion, trichiasis, corneal ulcer, anterior staphyloma, and cataract. Most of the general surgery is limited to hernia, bone work, and relieving extensive infections. An abdominal section is rarely seen. Appendicitis is very uncommon, and it is clinically noted that the few cases occurring have been subsisted on foreign food.

The subject of insanity has received very little recognition from a public standpoint and statistics are few, but from a report of 312 cases discharged from the John G. Kerr Hospital in Canton, the usual types and per cent of manic-depressive cases, dementia precox, and exhaustive psychosis were met with in practically the same proportions as elsewhere. Patients with what might be considered hopeless cases of dementia precox are able to return to their homes and earn their livelihood, as the easy-going pace of oriental life is devoid of the stress and competition met with in America. The custom of ancestral worship, in which it is the duty of every male to have offspring, is no doubt a strong contributory factor to mental disease, as at times demented patients are removed from the hospitals that they may marry and beget children.

Venereal disease is rife, owing to indifference and neglect, but cases of tabes and paresis are the exception.

One of the great evils that China is attempting to eradicate is that of foot binding. The practice is said to have originated in the imperial harem some 1,400 years after Confucius. Different theories exist as to its origin—one that it was a symbol of the women never having to work; another that it was to prevent them from ever ruling China; and still another that a princess was born with deformed feet and all parents were ordered to bind their daughters' feet that no jealousy might exist. Whatever the origin might have been, custom was established, and custom is hard to break in China.

The Manchu Dynasty issued several proclamations against the practice without effect, and both the rich and poor have suffered alike. An antfoot-binding society being formed, together with observations from mingling with foreigners, has put the general practice on the decline, so that it is rare to-day to see young girls with bound feet. The process consists in the application of short, heavy bandages to the feet of growing girls, beginning at the age of 3 or 4 years. The large toe is merely compressed, while the other four are gradually bent under the foot and walked upon until the atrophy produced gives the appearance of flabby appendages compressed deeply into the sole of the foot. Extreme arching of the instep results from the heads of the metatarsals being drawn back against the tuberosity of the os calcis. The tarsal bones are almost bent out of existence and the os calcis is brought into direct line with the tibia and fibula. Thus the individual walks on the tip of the heel, the distal end of the first metacarpal, the plantar surface of the great toe, and dorsal surface of the others, producing a complete atrophy of the calf muscles. The constant pressure often causes a shortening of the foot to 3 inches and locomotion is unsteady, giving the appearance of walking on stilts. The process is very painful in the beginning, and there is an old Chinese adage, "A pail of tears for every bound foot." Later the bandages become supportive and can not easily be dispensed with. The deformity is irremediable and enforces a great lack of bodily exercise as well as producing favorable sites for tubercular deposits.

China is well supplied with medicine shops, and many concoctions are prepared in which firm faith is placed. The horns of a deer finely powdered form a valuable tonic, and other parts of animals are prepared with reference to the supposed needs of the patient; thus, tiger bones for the weak, since the tiger is so strong. A common prescription for a cough contains baked barley, sugar, mashed beans, bamboo shavings, several roots, chalk, melon seeds (fresh and fermented), mashed pebble, wild flowers, and a broken clamshell. The average drug shop contains specimens of fresh and dried insects and reptiles, the centipede and scorpion being used for counter-irritants. Plasters are also used as counterirritants and to seal up sinuses to prevent the escape of blood and pus. They are of two kinds, the cheap and expensive, the quality depending upon the kind of paper or cloth used.

The matter of Chinese therapeutics has been summed up as "anything that is thoroughly disgusting in the three kingdoms of nature is considered good enough for medical use."

Native surgery is quite limited. The long, thin acupuncture needle is the favorite instrument. It is used either hot or cold to penetrate any part of the body, including aneurysms, the eyeball,

and the abdominal cavity. The knives used are of a crude nature, more designed for wood carving. Minor surgery is attempted, but only a few cases of any extensive procedure are noted.

No antagonism exists between the native and foreign doctors. They have their quacks, but the regular practitioner treats disease according to certain long-established rules and his required preparation consists in the statement, "I am a physician." An excellent reputation is at once established if a father or uncle before him has been a physician, as inherited receipts and secret remedies are in his possession. He is usually a middle-aged, dignified individual, which has much to do with his success. Ethics are not considered and a fee must be forthcoming before any treatment is given, so much down and so much guaranteed in case of a cure. Diagnosis is made from the pulse, and the size and quality of the prescription depends upon the financial status of the patient. The Chinese conception of health consists of a harmonious mixture of five elements, viz, gold, fire, wood, earth, and water, and disease exists when one predominates. Fever is too much fire and requires water to put it out.

The Chinese have a faint idea of physiology and anatomy and can locate organs and their relationship with fair intelligence, but dissection is never attempted and post-mortems are not done. Venous and arterial blood are not differentiated. Tendons and nerves are synonymous. Their general idea of anatomy can best be given by quoting Williams's *Middle Kingdom*, vol. 2, pages 180-182. "The brain is the abode of the yin principle in its perfection, and at its base, where there is a reservoir of the marrow, communicates through the spine with the whole body. The larynx goes through the lungs directly to the heart, expanding a little in its course, while the pharynx passes over them to the stomach. The lungs are white and placed in the thorax; they consist of six lobes or leaves, suspended from the spine, four on one side and two on the other; sound proceeds from holes in them, and they rule the various parts of the body. The center of the thorax (or pit of the stomach) is the seat of the breath; joy and delight emanate from it, and it can not be injured without danger. The heart lies underneath the lungs and is the prince of the body; thoughts proceed from it. The pericardium comes from and envelops the heart and extends to the kidneys. There are three tubes communicating from the heart to the spleen, liver, and kidneys, but no clear ideas are held as to their office. Like the pharynx, they pass through the diaphragm, which is itself connected with the spine, ribs, and bowels. The liver is on the right side and has seven lobes; the soul resides in it, and schemes emanate from it; the gall-bladder is below and projects upward into it, and when the person is angry it ascends; courage dwells in it; hence the Chinese sometimes procure the gall-bladder of animals, as tigers and

bears, and even of men, especially notorious bandits executed for their crimes, and eat the bile contained in them, under the idea that it will impart courage. * * * The small intestines are connected with the heart, and the urine passes through them into the bladder, separating from the food or feces at the caput coli, where they divide from the larger intestines. The large intestines are connected with the lungs and lie in the loins, having 16 convolutions."

In a land such as China, teeming with people, the majority of whom bear the stamp of untreated disease, where there is no knowledge of modern therapeutics, where the most elementary laws of health and hygiene are unknown, there is an unparalleled field for the ambitious medical man. One sees daily in the various clinics the most utter neglect of the poor and homeless. The patients are afflicted with all manner of disease, much of which is due to ignorance, malpractice, and neglect, and it is evident that one of China's greatest needs is a large army of native doctors trained in western medicine, who could educate their fellow countrymen in the simpler principles of sanitation and hygiene. Women doctors are included in this need, as many, particularly of the higher class, prefer death rather than be in the hands of a male physician. To-day four-year medical courses are being offered in several of the larger cities with foreign instructors in charge, but the classes are small; however, most of the hospitals have instituted three-year training courses, and both sexes readily adapt themselves to the work.

The essentials of public-health requisites are being taught and demonstrated in the different localities, but a prompt appreciation and cooperation can not be expected in a race who regard human life as their cheapest commodity.

U. S. NAVAL MEDICAL SCHOOL LABORATORIES

Additions to the pathological collection, United States Naval Medical School, July-September, 1915.

Accession No.	Tissue.	Diagnosis.	Collected by or received from.
1120.....	Smears from nasal secretion..	Leprosy.....	Surg. Raymond Spear.
1121.....	Stomach.....	Carcinoma.....	Medical Director M. F. Gates.
1122.....	Ovarian cyst.....		Passed Asst. Surg. E. H. H. Old.

Additions to the helminthological collection, United States Naval Medical School, July-September, 1915.

Accession No.	Parasite.	Host.	Collected by or received from.
19916.....	Ascaris, hookworms, and Trichuris trichiura.	Chicken.....	Passed Asst. Surg. L. W. Johnson.

SUGGESTED DEVICES.

AN AMBULANCE MOTOR BOAT FOR HOSPITAL SHIPS.

By E. M. BLACKWELL, Surgeon, United States Navy.

Every hospital ship should be equipped with one or more ambulance motor boats in order to be able to transfer patients easily, comfortably, and expeditiously from the ships of the fleet to the hospital ship or from the hospital ship to other ships or to naval hospitals on shore.

The ordinary ships' boats are not well adapted for transferring the sick or wounded from ship to ship or ashore, as there is no provision made in them for the comfort and protection of patients, who are thereby subjected to many discomforts and annoyances in consequence. Motor ambulance boats should have sufficient length and beam to make them steady and comfortable at sea and should have a large carrying capacity for patients. They should not be larger, however, than is necessary for the work of the ship, as the larger the boat the more difficult it is to handle, lower, and hoist on board.

The boat here described is of very simple construction and can be very easily improvised out of a sailing launch or a large cutter. The dimensions of the boat should be about as follows: Beam, 8 feet; depth, about 5 feet; draft, about $2\frac{1}{2}$ feet. The cockpit for patients and other passengers is situated amidships, which is the most comfortable location for them, the coxswain's quarters just forward, and the motor machinery space just aft of it, all of which are surrounded by a hatch coaming about 6 inches high. The boat is decked over fore and aft and on each side up to the hatch coaming. The coxswain's quarters, cockpit, and machinery space are covered with ordinary canvas canopy on a pipe frame, which is simple and inexpensive.

The cockpit is 18 feet long and 6 feet wide. It has benches extending along each side and across both ends for patients and passengers. Two movable bars extend across the cockpit on a level with the top of the benches about 5 feet from the forward and after bulkheads. On these two bars and the forward and after end benches 6 stretcher patients (3 forward and 3 aft) can be comfortably accommodated. On top of the hatch coaming are four more bars

across the cockpit, one 3 feet and one 5 feet from the forward hatch coaming and one 3 feet and one 5 feet from the after hatch coaming. On these bars 6 more stretcher patients (3 forward and 3 aft) can be comfortably accommodated, giving a total of 12 stretcher patients that can be carried at one time, besides 5 or 6 ambulant cases that could sit on the benches between the forward and after tiers of stretchers. The stretchers would be fastened to the cross bars to keep them steady and in place. If only the forward or the after part of the cockpit were filled with stretcher patients, the boat would have a capacity of 6 stretcher patients and 18 ambulant patients, or if there were no stretcher patients the boat would have a capacity of about 30 patients. Between the forward and after tiers of stretchers there will be a 4-foot gangway, in which the stretchers can be handled and the patients cared for.

In addition to the patients carried there would be room enough for the patients' baggage and the necessary attendants. The boat should be fitted with lockers for medicines and all kinds of first-aid and emergency dressings and appliances, and two or three stretchers should always be kept in the boat.

The umbrella canopy is simple and inexpensive and affords ample protection against all kinds of weather. On each side of the canopy at the coxswain's quarters, the cockpit, and the machinery space there should be openings with canvas flaps to afford ingress to and egress from those spaces. The canopy should be divided in the middle over the cockpit and the forward and after flaps laced or buttoned together.

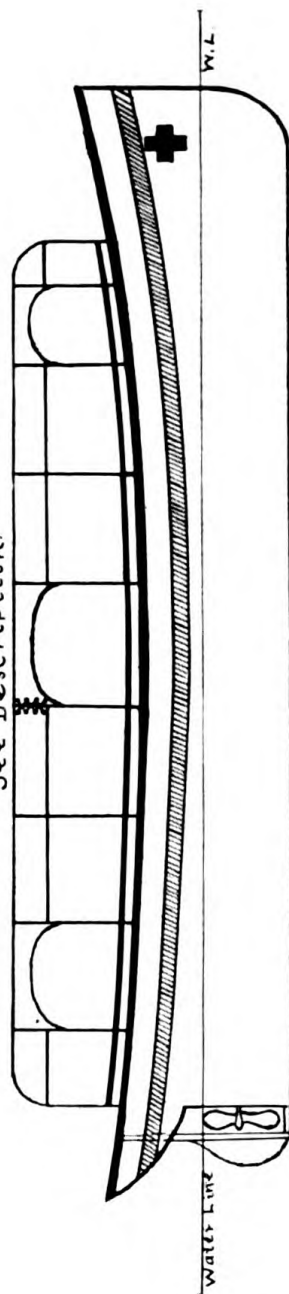
The stanchions of the pipe frame forward and aft of the openings in the canopy to the cockpit should be hinged at the deck or made to slide fore and aft so that the top of the canopy could be opened up in order that patients might be hoisted out with cranes, or their transference from the boat otherwise facilitated. It would be practicable to have extension tops for the cockpit, such as are used on automobiles, which could be shipped or unshipped as desired.

When the hospital ship is serving with the fleet it would be well to have the ambulance boat call at the various ships at certain times for patients to be transferred to the hospital ship, in the same manner as ambulances make regular trips from the hospitals to the navy yards and receiving ships. The ambulance boat should also always be ready for emergency calls. By having the ambulance boat call at the various ships at regular times when notified that there are patients for transfer it would simplify and expedite their transference, lessen the work and interfere less with the routine of the fighting ships.

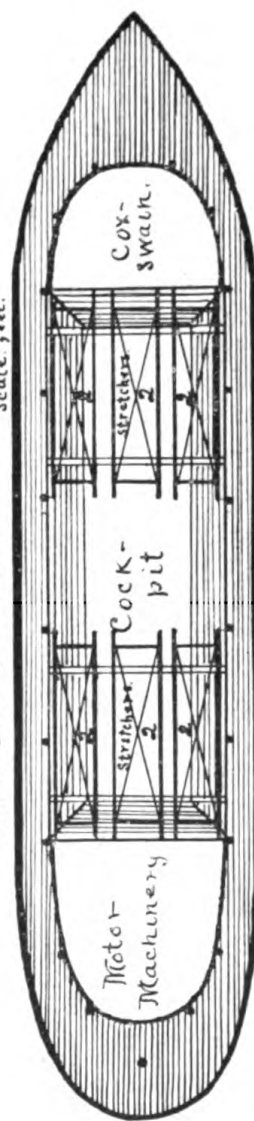
The accompanying diagram of the boat fully explains its essential features. It is of very simple and inexpensive construction, and

Blackwell—Ambulance Motor Boat.

Ambulance Motor Boat for Hospital Ships. See Description.



Dimensions.
Length overall 36' Depth 5'
" water line 33' Draft 2 1/2'
Beam 8' Speed 10 knots
Scale 1 inch = 4 feet. 1 2 3 4 5
Scale, feet.



Dimensions & Capacity of Cock-pit
Length 18' Breadth 6'

1. 12 Stretcher Cases & 6 Other Patients
2. " " " 18 " "
3. " " " 30 " "

Baggage & Hosp Corps attendants in addition.

E. M. Blackwell
June 1915

would be very useful for transferring other passengers, liberty parties, etc., and could be also used for carrying stores.

It will be very easy to handle this boat in hoisting and lowering it, as there is no smokestack to interfere or be unshipped, and the chain bridle for hoisting and lowering can be attached at each end of the cockpit and hooked onto the falls through the opening in the top of the canopy. When not in use the bridle can be stowed beneath the deck of the cockpit. It will thus always be in the boat and attached to it ready for use, and will act as ballast to keep the boat steady and comfortable.

CLINICAL NOTES.

UNUSUAL TYPE OF TYPHUS FEVER ON U. S. S. "MONOCACY." REPORT OF CASE.

By W. B. HETFIELD, Assistant Surgeon, United States Navy.

History of case. B—, seaman, reported to the sick-bay January 7, 1915, complaining of an upset stomach. He admitted that for the past week he had been drinking whisky in a considerable amount while ashore. During this time, however, he had never returned aboard intoxicated. About 10 days previous to this event, while on all-night liberty, he admitted exposure and had passed the night in a native brothel. A day or two previous to this he also spent the night ashore, but denied exposure; where he spent the night we have been unable to determine. For five days previous to his reporting sick he had been troubled, he stated, with vomiting, but attributed it to his consumption of alcohol, and had stayed on duty, not feeling ill enough to attend sick-call. He stated that he had no headache, no pain in his back, and he had been successfully vaccinated.

Physical examination on admission.—The man on admission at 9 a. m. of the morning of January 7 looked decidedly ill. He had no fever, although his pulse rate was increased to 112. He had a slight cough, but no sore throat. The only other positive thing found was a few purpuric spots, mostly on his legs, which he stated had been there for two months. He claimed that his vomitus was of a reddish hue.

The case apparently was one of severe gastritis and suitable treatment was prescribed. He soon fell into a comfortable sleep. At 10 a. m. he was aroused for medication and was seen at this time by the medical officer. The hospital steward saw him at 11 a. m. and noticed nothing unusual. The medical officer saw him again at 12.30 p. m. At this time he had a decided scarlatiniform redness over his face, extending down onto his thorax. A papular rash was well out over his face, lips, eyelids, and gums. Throat very sore and injected, but at this time showed no rash. There was also a papular rash over his thorax and abdomen, legs, arms, and back, and the scarlatiniform redness was noticeable about his ankles and wrists. Since admission there had been no vomiting. Temperature, 105°; pulse, 115; respiration, 18. He had no rigor.

The man was at once removed to the French Hospital and the sick-bay and forward hold where he had been employed fumigated. By the time the case reached the hospital (2 hours) the papular rash was much more prominent all over his body and now covered his throat in addition. Temperature, 104° ; pulse, 114; respiration, 20. The man, while somewhat torpid, could answer all questions rationally and displayed a marked lack of prostration and no delirium. Up to the present time all of his rash could be made to disappear on pressure. This same night, however, many of the papules, especially on the abdomen and chest, disappeared and were replaced by macules, very much like typhoid rose spots, which could be made to disappear only with difficulty. The spleen was not palpable. The tongue was covered with a brown crust. Urine only showed ordinary febrile characteristics.

On the morning of the 8th, practically all of the abdominal and thoracic papules had become macules. Papules were still thickly clustered on his face, lips, gums, and throat, and some were becoming hemorrhagic. Temperature, 104° ; pulse, 115; respiration, 20. A few papules had a tendency to become vesicular on his legs but none were typically so. By the evening of the 8th the man's mind had become much clearer and he stated that he felt better. His throat was very bad, however, and was covered with distinctly individual papules. Temperature, 104° ; pulse, 115; respiration, 19. Nearly all of his papules and macules were by this time hemorrhagic, not disappearing at all under pressure, and on his arms and legs discolorations were appearing which looked like the start of a large subcutaneous hemorrhage. The remarkable feature of the case at this time was that in spite of his decided extreme illness, subjectively the man should be so little disturbed. His only complaint was of a sore throat. He was passing the night apparently with comfort and having his throat attended to regularly. At 5 a. m. of the 9th he complained of some difficulty in breathing but was not cyanosed (nurse's statement). About 5.36 a. m. he had a violent attack of dyspnea and died within the hour.

Autopsy.—Face, body, and limbs covered with hemorrhagic papules and macules. There were several large discolorations on his arms and legs, which on section proved to be subcutaneous hemorrhage, a few tubercular glands (bronchial) and a healed focus in the left apex. There were a few hemorrhagic spots in the pleura, and very many in the pericardium. Heart normal. Liver very large and showed an early fatty change; kidneys large and showed a cloudy swelling. Spleen congested and large. Alimentary track normal. Throat, papular rash. Epiglottis showed a decided catarrhal inflammation and was somewhat swollen but still patent. However, an edema,

which post-mortem had subsided, seemed the most probable cause of his sudden death.

From this description it is evident that the diagnosis of typhus was by no means an obvious one. Surgeon-Major Assmy, of the German Army, saw the case with the medical officer. No facilities for blood work were at hand, and we could find no account in the literature available in Chungking of typhus fever with such throat involvement and without marked prostration and delirium. His most prominent sign of this disease, and one on which we based our diagnosis, is mentioned by Collie as characteristic, i. e., a rash which at first disappears easily on pressure, later with difficulty, and later not at all, and particularly the subcutaneous hemorrhage. Against the possibility of black measles was the absolute lack of prodromal symptoms, conjunctivitis, bronchitis, and photophobia, together with the peculiar hemorrhagic rash. We felt that we could rule out smallpox by the absence of backache and other prodromes; and especially by the fact that his temperature rose and reached its maximum with the onset of the rash instead of dropping. Furthermore, no vesicles ever appeared.

INJURY BY DYNAMITE EXPLOSION.

By G. C. THOMAS and L. W. JOHNSON, Passed Assistant Surgeons, United States Navy.

The patient was a male, aged 33. He was using dynamite on the reef (Guam) to kill fish, and it is believed that a stick exploded in his right hand.

He reached the hospital several hours later, having lost much blood in the interval. The anterior surfaces of the face, arms, chest, and abdomen, from the waistline up, were covered with innumerable lacerated wounds caused by particles of the *cascajo*, which were driven into the skin but did not penetrate through the muscular layer. More extensive lacerations were located at the right angle of the mouth, right eyelid, neck, and left chest. The right hand was missing, only the tendons and a few fragments of the metacarpal bone of the little finger remained. The general condition of the patient appeared very good.

An effort was made to administer chloroform, but with the first inhalation, the inhaler being still 2 inches from his face, respiration ceased. After a few minutes of artificial respiration he began to breathe again, and the anesthetic was resumed without further mishap. The right forearm was amputated at the middle, and effort was made to repair some of the lacerations, but the tissue was too pulpy to hold.

After the operation was completed and all wounds dressed his general condition seemed very good. He joked with his relatives, and his only complaint was of thirst. During the night and the following morning he vomited several times a dark-brown liquid with particles of tissue and blood clots, probably from the lacerated tissues of his mouth. He was delirious at times and tried to get out of bed; but his general physical condition continued to improve up to 4 p. m., when he died suddenly, 24 hours after he received his injuries.

Autopsy.—The numerous lacerated wounds do not penetrate the muscular layer except about the mouth. The brain and meninges show only moderate congestion. The anterior surface of the right lung has an area of extravasation 2 by 3 inches and 1 inch deep. Both lungs are congested and have numerous punctate extravasations. The wall of the right ventricle, where it comes in contact with the chest wall, shows deep red and purple ante-mortem discoloration resembling severely contused muscle. The intestine and stomach are distended; portions in contact with the anterior abdominal wall show numerous punctate hemorrhages, some with necrotic centers. The parietal pleura and peritoneum show only post-mortem changes.

An excellent index to the violence of the explosion is found in the extensive injuries to the internal organs, which injuries must have been due to their inertia opposed to the force of the explosion.

A CASE OF HEMORRHAGIC PANCREATITIS.

By G. C. THOMAS and L. W. JOHNSON, Passed Assistant Surgeons, United States Navy.

The patient was a female, aged 32, known to be a tuba drinker and a betel-nut chewer. She was taken sick on April 9 with pain in the epigastrium, and on April 12 she was brought to the hospital complaining of frontal headache and diffuse pain of moderate degree in the epigastrium. Examination showed slight tenderness in the epigastric and left hypochondriac regions with no distention or rigidity. The urine showed nothing abnormal; the stools showed the usual infection with ascaris, hookworms, and whipworms. Throughout the disease the temperature ranged between 99.4° and 101°; the pulse between 110 and 130; the respirations between 22 and 28.

Early in the morning of the 13th she vomited about 450 cubic centimeters of a black "coffee-ground" fluid consisting largely of partly digested blood, the vomiting being accomplished with slight effort. During this day she vomited four times, the total quantity being about 1,200 cubic centimeters, and complained of great thirst. There was considerable abdominal distention. The mind was clear

throughout. At 7:15 p. m. she was seen by the medical officer and at that time appeared to be in much better condition than before. At 7.40 she complained of sudden pain in the epigastrium, "the worst pain I have ever had," and died suddenly.

Autopsy.—The body was well nourished; no jaundice. The great omentum showed numerous hemorrhagic areas but no fat necrosis. The stomach contained 50 cubic centimeters of partially digested blood; the mucosa of the stomach and duodenum showed a moderate degree of general congestion, no ulcers or hemorrhage. The liver was large, firm, yellow, and pale; cross section showed an excess of interlobular connective tissue. The gall-bladder showed no abnormalities and the ducts were patulous; many hemorrhagic areas were seen in the fat of the hepatic ligaments. The pancreas was generally congested and there were many hemorrhagic areas scattered throughout the parenchyma and the surrounding fat; no fat necrosis was discovered. The diaphragm, pericardium, perirenal tissue, peritoneum, and ovaries showed numerous punctate hemorrhages, limited to the fat in the tissues. The kidneys showed a moderate degree of interstitial nephritis.

Interesting points are the following: History of alcoholism, moderate range of temperature, sudden death, and absence of jaundice and fat necrosis.

SALVARSAN IN THE TREATMENT OF SCHISTOSOMIASIS. REPORT OF CASE.¹

By D. C. POST, Assistant Surgeon, United States Navy.

That schistosomiasis may manifest itself in a manner confusing to the average observer is shown by the following report:

About August 15, 1914, while the *Palos* was at anchor at Ichang, China, the hospital apprentice had an attack of diarrhea, with blood-tinged mucus in the stools. As is quite frequent among sailormen, he did not report his complaint until the third or fourth day. Microscopical examination of the stools at this time revealed nothing of diagnostic value. No amebas, eggs, nor flagellates were found. He had a slight fever at this time. Emetin, $\frac{1}{2}$ grain, three times a day, was given for four days, with disappearance of the diarrhea. No rash was noticeable. As the *Palos* had no microscope at this time, further examination was impossible, because we left Chungking on August 20. No blood count was taken at this time. Until October 24 nothing occurred to give the patient cause for complaint. But, as it happened, his second illness came at an inopportune time. Here again he was seized with an attack of diarrhea, which he did

¹ Received for publication July 12, 1915.

not report to the medical officer until the fourth day (October 24), when he was found to have a fever, as described below, in an extract of the entries in his health record from October 24 to date of recovery.

"U. S. S. *Palos*, en route Chungking to Ichang, China, October 24, 1914: Cholecystitis acute. Origin in line of duty. Due to infectious and dietary causes. Patient complained of having had diarrhea for five days previous to this date, but about which he did not report to his medical officer, not thinking it serious. On getting under way the vibration of the ship caused patient some distress in right upper quadrant of abdomen. In morning temperature was 99.8°, at 11.30 it was 101.2°, at 1 it was 102°, with increasing distress. Palpation of abdomen reveals some protective rigidity of upper belly of right rectus. Heart and lungs negative. Urine shows faint trace of albumin (nitric acid and heat). Urine is of a decided brown color, with yellow foam on shaking.

"October 25: Distress is progressive. Temperature down in morning, up in afternoon to 102°. No nausea nor vomiting. Patient has eaten nothing but liquids since October 22.

"October 26: Condition about same, except that a perceptible swelling is beginning to appear in the region of the right upper belly of the rectus in right hypochondrium. Two stools to-day. The first was semiformed and natural in color. Second was thin and tarry. Temperature in evening was 102°; pulse, 100 per minute, of good quality. Patient transferred to the International Hospital to-day via steamer *Tung Ting* from Ichang.

"October 27: About same.

"October 28: Arrived Hankow, transferred to hospital. Very much weaker and considerably icteric. White blood count, 9,000, with 12 per cent eosinophiles. Pain and tenderness still persist. No reflected pain in shoulders. Stools examined. No amebas found, but Charcot-Leyden crystals numerous. Symptoms much like liver abscess now, as if abscess might be located in left lobe of the liver. No nausea nor vomiting. Temperature has never been above 102°; always near normal in morning. Emetin hydrochlorid, $\frac{1}{2}$ grain three times a day, started to see effect.

"October 29: About same. Good catharsis from calomel 1 grain and salts 1 ounce. No eggs found in stool. Temperature normal this a. m.

"October 30: Temperature stayed down. Patient is feeling much better. Change under emetin is very marked.

"October 31: Much better. Na_3PO_4 two drams in hot water every morning. Emetin continued. Soreness in liver much less.

"November 1: Still improving. Urine is getting lighter in color. Jaundice has disappeared.

"November 2: Better.

"November 3: Same.

"November 5: Same tenderness still exists on right side.

"November 6: Last evening his temperature suddenly went up to 101°; down to normal in morning. Urine negative.

"November 8: Patient is running an afternoon temperature each day from 100° to 101°, with an eosinophilia of 12 per cent. Tenderness in region of lower part of liver is persistent. With lack of chills and rigors, an abscess can be ruled out. The opinion is that this is a schistosoma infection with hepatic involvement.

"November 11: Eggs were found in the stools. Answer the description of *Schistosomum japon*. Six-tenths gram of salvarsan given intravenously. Change of diagnosis.

"November 13: Schistosomiasis intestinal. Origin in line of duty. Dietary causes.

"November 15: Transferred to U. S. S. *Helena's* care, as *Palos* is leaving port for Shanghai.

"D. C. Post,

"Asst. Surgeon, U. S. Navy.

"U. S. S. *Helena*, November 17, 1914: Schistosomiasis, intestinal, in line of duty, incident to infectious agents. Symptoms as above. Pain and tenderness over right hypochondrium has almost disappeared. Kept in bed; special diet. Treatment symptomatic.

"November 23, 1914: Continued improvement. Temperature normal. Patient up and about. Daily examinations of stools negative. Blood examination shows 10 per cent eosinophilia. In view of the eosinophilia and the above symptoms, the diagnosis is almost unquestionable.

"November 24, 1914: Continued improvement. Patient is up and about. Temperature is now normal.

"November 27, 1914: To light duty. All clinical symptoms have disappeared. Eosinophilia is 12 per cent.

"W. L. MANN,

"P. A. Surgeon, U. S. Navy.

"NOTE.—December 15, 1914. Patient has almost returned to his former normal condition. His transfer to duty off the Yangtze River has been recommended, as this prevents the possibility of a reinfection. Further examination of feces negative. On November 11, 1914, 0.6 gm. of salvarsan was given intravenously; 28 hours later his temperature became normal for first time in two weeks, and has remained normal since.

"W. L. MANN,

"P. A. Surgeon, U. S. Navy."

During the two days required to make this trip from Chungking down through the gorges to Ichang the vibration of the ship was

very marked, especially in the after part of the ship in the sick-bay country. This caused the patient to suffer extremely. He required morphin to enable him to sleep at all. Upon arrival at Ichang the hospital authorities refused to accept the case unless the treatment was left to them entirely, so he was accompanied by the medical officer, by merchant conveyance, to the Hankow International Hospital. Here consultation was held with Dr. Aird, who was of the opinion that there was an amebic abscess of the liver. Although emetin was given, no change in the diagnosis was made in the health record, pending more positive evidence by microscopical findings.

Contrary to the doubtful results obtained in Laning's cases (U. S. Naval Medical Bulletin, January, 1914), there was a marked change in this case from the date of administration of salvarsan. The experience of Passed Assistant Surg. W. L. Mann, U. S. Navy, has been similar in the use of salvarsan in schistosomiasis.

As noted in a previous article (p. 627), Assmy was at this time doubtful as to the existence of this disease in Chungking. It was thought that we were dealing with an exacerbation of an infection contracted in Ichang, where the disease is known to exist. The initial symptoms of edema and urticaria were lacking, it is true, but the experiences of Lambert and Aird show that there is no fixed train of symptoms in all cases.

How this patient could have become infected, in the light of experiments carried out by Leiper in Japan and China, it is difficult to say.

That the intermediate host has been found to be a mollusk (*Katayama nosophora*) clears up many points of doubt as to the mode of infections. In his article (Brit. Med. Jour., Jan. 30, 1915) Leiper clearly shows, it seems to me, that the most usual port of entry must be the anus. The foreigners at Yochow and Kiukiang are generally aware that the danger of infection is not as great if the hips have not been in contact with the infected water. Swimming in infected water or falling into infected pools of water while snipe shooting are conceded to be very dangerous.

Through the kindness of Dr. Lambert, of Kiukiang, I am allowed to quote from his paper, read before the Society of Tropical Medicine and Hygiene October 20, 1911, "Fevers with Urticaria and Eosinophilia and Their Relation to Infection with *Schistosomum japonicum*."

Discussing the manner of infection, he says: "And the cause is the entry into the system, probably through the cutaneous surface, of the nonadult forms of the *Schistosomum japonicum*; at what stage of development is at present unknown."

How near this was to the truth was only too clearly shown by Leiper more than three years later, the nonadult stage being the cercaria found in sporocysts in the liver of the snail.

Discussing further he says: "It is noticeable that bitches suffer more severely than dogs. Possibly this may be due to the embryos gaining access in large numbers through the mucous membrane of the vagina, though Houghton and myself found no adult worms in any of the vessels of the generative organs in two bitches we examined."

The extreme difficulty in finding positive evidence of any site of entrance through the skin in infected cases would lead one to suspect the anus or the urethra in males, and vagina, urethra, and anus in females as the port of entry.

Almost every case gives a history of either swimming in infected water or among the sportsmen of wading in infected pools. One of Lambert's cases had a nongonococcal discharge from the urethra and later eggs were found in his stools. Experience has shown that sportsmen who wear heavy woolen socks and puttees or boots do not contract the disease as a rule.

Quoting again: "At least it is possible to instruct foreigners living in endemic areas to protect themselves when out shooting, or engaged in any avocation which may take them into infected waters, by always wearing closely woven clothing and woolen stockings and puttees with heavy boots. Attention should also be directed to the extreme risks run by bathing in ponds and backwaters, and near the banks of the Yangtze itself; and even to the possibility of contracting the affection by using unfiltered and unboiled water for the daily bath. Commanders of men-of-war and merchant vessels should be instructed not to allow bathing anywhere along the Yangtze, or in the lakes and rivers running into it; and they should see that their men are well protected with trousers, puttees, boots, and singlets when they go over the side on duty in case of stranding on sand banks, etc."

In the case reported the only plausible explanation seems to me to be that the water in which the patient bathed may have become infected from the decks, as at this time water from over the side frequently gets on the decks which are only a foot above the river surface.

Before the *Palos* began cruising on the Siang River during the months of January and February, 1915, it was recommended that all water used in washing down decks should be sterilized. So a large tank was rigged aft and a jet of steam led into it. This tank was carefully filled daily from over the side and kept at boiling point for half an hour each morning. There was no infection of the crew during the stay of the *Palos* in waters in the vicinity of Tungting Lake.

I wish again to quote a valuable hint to those searching for the eggs of *Schistosomum japonicum*: "In this connection it might be

suggested that a rather hard stool be taken, that it be examined in the vessel in the condition it was passed without any admixture with urine, water, or disinfectants; that a very careful search be made on the top and in the cracks of the stool for the little threads of mucus, often bloodstained, but not necessarily so, containing the eggs."

Lambert tells me that the infected district in the vicinity of Kiukiang lies across the river from the city and the lagoon leading back to the foothills of Kuling.

While the intermediary host has been found in Japan, it has not as yet been found in the infected districts of China.

AN UNUSUALLY SEVERE CASE OF URTICARIA.

By W. E. EATON, Passed Assistant Surgeon, United States Navy.

I wish to report an exceptionally severe case of urticaria apparently caused by the ingestion of strawberries, and attended by fever, generalized swelling, and hemorrhage into the lesions.

The patient gives a previous history, while in the Philippines, of having been struck on the left foot by a large sting-ray, which resulted in great swelling and such a serious condition of the foot as to cause greatest alarm as to a probable recovery without removal of the foot.

During this present attack the swelling of this foot was much greater than was expected or than existed elsewhere.

Preceding the attack the patient had been in good health, but for the previous six days had eaten a large number of strawberries twice a day at his boarding place.

The bowels became somewhat constipated.

On Tuesday evening and during the night he noticed more or less general itching and an eruption of small wheals. The next day (Wednesday) the eruption became general all over the face, trunk, and limbs. I saw the case on this day.

The eruption consisted of small urticarial wheals about the size of a split pea or bean, were pink-red, moderately raised, and at times there was very marked itching. The case seemed simple urticaria, and castor oil, modified diet, with antipruritic lotion and potassium citrate 10 grains t. i. d. were recommended.

There was some improvement on Thursday, but that night there was great itching, slight nausea, tense, "grippy" headache, and sweating.

When seen Friday all wheals had taken on a dark purple hemorrhagic appearance; there was a general swelling about the face, arms, hands, and lower extremities, an eruption on the mucous membrane of the mouth, general constitutional disturbances, and temperature of

102°, pulse 110, respiration 22. The patient seemed very depressed and sick, with persistent nausea.

He was sent to the hospital, put to bed, given calcium lactate 1 dram as an initial dose and subsequently 10 grains three or four times daily, 5 grains of aspirin three times daily, and simple diet.

The next day (Saturday) the temperature and general disturbances passed off and the patient became comfortable.

The eruption persisted as indurated hemorrhagic-looking papules for nearly a week, leaving staining of the skin for a much longer period.

The points in this case deserving comment are the progression of the lesions from simple to hemorrhagic wheals, the severe swelling, the severe constitutional disturbances, and the fact that so severe a reaction was produced by strawberries.

EARLY REINFECTION WITH SYPHILIS.

By T. W. RICHARDS, Surgeon, United States Navy.

X—, aged 26, contracted syphilis about the end of May, 1914. Late in June secondary symptoms developed and Wassermann test was strongly positive. He received salvarsan June 28 and July 8, and neosalvarsan July 20. Subsequent treatment consisted in a course of succinimid of mercury, intramuscularly, which was continued uninterruptedly until the following May, except during October, 1914. Under salvarsan all symptoms promptly cleared, and for a period of 10 months repeated examinations failed to reveal any manifestations of the disease whatever; Wassermanns were taken on July 20 and in August, September, and October, 1914, and on June 10, 1915, all being negative.

About May 20, 1915, some three weeks after exposure to infection, patient noticed a small sore near base of penis, soon followed by slight enlargement of the inguinal glands. About this time he went away on leave and was not again under observation until July, when his condition was as follows: The sore on penis had developed into an ulcer, with heavily indurated base, presenting every appearance of a "hard chancre"; pharyngitis was very marked, glandular enlargement general, and on body and limbs there was a profuse macular eruption which completely conformed to the type most commonly met with in secondary syphilis. Wassermann was strongly positive for the first time in 11 months.

While the possibility that this was a case of recrudescence obviously can not be absolutely excluded, the evidence in favor of reinfection is about as conclusive as it well could be in the absence of more definite

means of determining when a "cure" is final and complete. Probably the weakest point lies in the very short time elapsing since infection first occurred. Formerly, syphilographers generally concurred in the opinion that cases of reinfection in this disease were exceedingly rare, some writers going so far as to deny the possibility altogether. But, since the advent of salvarsan, it seems probable that these views are subject to modification. While the literature, in general is not available, I have seen in the material at hand recent reports of two cases, and in one of these reinfection appears to have occurred after only 11 months' freedom from symptoms.

A FATAL CASE OF CECAL ULCERATION WITH EXTENSIVE COMPLICATIONS.

By W. L. MANN, Jr., Passed Assistant Surgeon, United States Navy.

F —; seaman, age 31; previous service, 12 years. Admitted with "diagnosis undetermined" on October 14, 1914. Patient came to sick-bay complaining of vague, indefinite pains over chest and abdomen. Physical examination was negative except for a slight bronchitis. Later there was diffused abdominal tenderness, but no rigidity. He complained principally of pain over left costal margin. Blood count showed white cells 19,000 per c. mm., with polynuclears 76 per cent, mononuclears 20 per cent, and eosinophiles 3 per cent. The examination of feces demonstrated nothing except ascaris ova. There was no history of dysentery.

On October 17, 1914, pains shifted to right hypochondrium. He was kept under close observation, and daily microscopical and laboratory tests failed to clear up the diagnosis.

October 20, 1914: There is questionable increase in liver dullness, but no sign of hepatic tenderness is present. Temperature 100 to 102° F. White blood cells, 25,000 per c. mm. Slight rigidity of abdomen is detectible. A mass is palpable over right iliac fossa and some tenderness is present. After consultation it was decided that the symptoms justified an appendectomy. The appendix was found to be much inflamed and adherent to cecum. Four or five cartilaginous-like masses about the size of walnuts were present on cecum.

October 22, 1914: Some improvement. Pulse stronger. Temperature normal.

October 24, 1914: Patient becomes very restless and delirious, with symptoms not unlike delirium tremens. Râles are increasing over both lungs and slight dullness present.

October 25, 1914: Patient is very weak and exhausted. Free stimulation resorted to. He became gradually weaker and died at 2 p. m.

Autopsy.—Four ulcers of different sizes were present in cecum. The above nodular masses on the cecum were indurations around these ulcers. The large intestines contained a large amount of blood from a recent hemorrhage from an ulcer about 2 inches from the base of the appendix. Both lungs presented incipient lobar pneumonia.

An abscess of the liver about 5 centimeters in diameter existed upon the gastric surface of the left lobe partly involving the tuber omentale; another abscess, 4 centimeters in diameter, was present in superior and posterior portion of right lobe. Four smaller abscesses were present in the liver substance. Microscopical sections of the pathological material are being made by the Harvard Medical School, of Shanghai, China. A preliminary report states that the etiology is indefinite, possibly amebic. No motile protozoa were discoverable, ante mortem or post-mortem.

The interesting points in this case: (1) Obscurity of symptoms. (2) The extensive complications—intestinal ulceration, fatal intestinal hemorrhage, secondary involvement of the appendix, multiple hepatic abscesses, double lobar pneumonia with acute delirium.

EDITORIAL COMMENT.

SCARCITY AND COST OF MEDICAL SUPPLIES DUE TO DISTURBANCE OF EUROPEAN MARKETS.

As a direct result of war conditions in Europe, many items listed on the Supply Table, especially under the caption "Medicines," have materially advanced in price, in some instances as much as from 200 to 1,200 per cent, between June, 1914, and June, 1915.

Some supplies are only procurable even at advanced prices at infrequent intervals, and some are out of the market and not procurable at any price.

A few of the latter are cresol, diethylmalonylurea (veronal), petrolatum liquidum, phenol, potassii permanganas, sodii bromidum, and sulphonethylmethanum (trional).

Substitutes are being sought and may be found for some of the supplies not now obtainable. Neither liquid petrolatum nor potassium permanganate is being imported from abroad or manufactured at home. For the former the Naval Medical Supply Depot is prepared to issue a mineral oil of American origin, which for internal administration it is believed will be found to be superior to the official preparation, and which is neutral, colorless, odorless, non-fluorescent, free from carbonizable impurities and sulphur compounds, and with a viscosity of a Russian oil. It is to be hoped that other equally good substitutes will be found for other articles not at present obtainable.

BIND YOUR BULLETINS.

It is to be regretted that from the first inception of the idea of publishing a quarterly bulletin devoted to matters of particularly pertinent interest and use to the naval personnel an effort was not made to inaugurate and preserve consecutive bound files on each ship and station. There is no similar amount of page matter which will more frequently answer the questions that may be otherwise eluding the naval medical officer.

The nine years of existence of the Bulletin, completed by this number, embrace over 5,000 pages of very valuable contributions on "matters relating to hygiene, tropical and preventive medicine,

pathology, laboratory suggestions, chemistry and pharmacy, advanced therapeutics, surgery, medical department organization for battle, and all other matters of more or less professional interest and importance under the conditions peculiar to the service and pertaining to the physical welfare of the naval personnel."

Many of these are contributions on and answers to questions that frequently confront other medical officers, who should profit by the observations of those who have gone before.

As of particularly pertinent interest is the topographical nature of the present number, headed from that point of view by the most excellent and painstaking article of Dr. Laning.

Those who have been up the Chinese rivers may appreciate that they have missed something of what was available; those yet to go may soon be referring to this number for valuable data for themselves and for their patients. It is now too late to provide back issues of the Bulletin, but the bureau will gladly bind, for ship or station use, such copies as may be sent in. It is urged upon medical officers, once such files are established, to see that sufficient care is taken to preserve each issue till the end of the year.

PROGRESS IN MEDICAL SCIENCES.

GENERAL MEDICINE.

E. THOMPSON, Surgeon, and E. L. WOODS, Passed Assistant Surgeon, United States Navy.

MARTIN, C. J. The recent epidemic of smallpox in New South Wales. *Proc. Roy. Soc. Med.*, viii, No. 2, December, 1914.

The epidemic was of an extremely mild type; among over 1,000 cases only 1 death occurred. The earlier cases were so mild and the eruptions so scanty that no medical man was consulted, and smallpox must have been present in Sydney for at least six weeks before the department of health had any knowledge of its presence. The first group of cases appeared among the employees of a factory, and in each case the eruption had been preceded by an attack of so-called influenza, in which the most prominent symptoms had been headache, vertigo, shivering, and general pains. In some there had been back-ache and in a few slight vomiting.

The infection was traced to a steward on a steamer which came to Sydney from Canada. During 1896 a very mild type of smallpox began to prevail in the south of the United States and gradually spread over the whole country and into Canada. It is recorded that 3,294 cases occurred in North Carolina without a death. While this atypical form was spreading in the United States, the classical and more severe form appeared from time to time. Both forms appeared to breed true, and each was believed to be smallpox because of the same period of incubation, prodromal symptoms, time of appearance of eruption, distribution of eruption, and characteristic lesions. Vaccination protected against both forms of the disease and both produced immunity to vaccinia.

Of the 1,070 persons attacked up to December 31, 1913, in this epidemic, 69, or 6.4 per cent, had probably been vaccinated in infancy or over 13 years before being attacked; 999, or 93.3 per cent, had never been successfully vaccinated before contracting smallpox.—(L. W. JOHNSON.)

VANDERHOOF, D. The causes of indigestion. A study of 1,000 cases. *Bull. Johns Hopkins Hosp.*, May, 1915.

The article is based on a study of 1,000 consecutive cases complaining of chronic or recurring indigestion, such as "stomach trouble," dyspepsia, abdominal pain or distress, flatulence, vomiting, etc.

Attention is called to the work of Mackenzie and others who have shown that in visceral disease there is irritation of certain areas in the spinal cord, and when such are near the reflex center of the stomach you get symptoms referable to that organ which simulate a local lesion. In gall-stone colic, or in acute inflammation of the appendix, such are noted, the same being the case in chronic affections of those organs.

The clinical diagnoses given in the following table were made by the author and Dr. Hutcheson after thorough history, physical examination, laboratory analyses, and X-ray studies. Surgeons were consulted and many of the cases had operations performed.

Summary of table.

	Per cent.
Appendicitis.....	24
Cholecystitis.....	11
Peptic ulcer.....	10
Neuroses.....	10
Cancer (stomach and intestines).....	5
Chronic gastritis, visceroptosis, peritoneal adhesions, enterospasm, and enterogenous toxemia.....	10
Affection of kidneys, lungs, heart, eyes, blood, ductless glands, ears, central nervous system, female pelvic organs, migraine, chronic infectious disease.....	25
Miscellaneous conditions (pellagra, amebic dysentery, malaria, diseased tonsils, cyclic vomiting, intestinal parasites, etc).....	5
	<hr/> 100

The author believes that the percentages given to peptic ulcer and neuroses are too high and that many of those cases if followed further would have proved to be instances of diseased appendices or gall-bladders, and that 40 per cent would be nearer the true incidence of those diseases in cases of chronic or recurring indigestion.

The following table gives the summary of results following operations on the cases diagnosed as appendicitis or cholecystitis. Some patients so diagnosed refused operation, and some could not be followed in order to obtain the result.

Results of surgical treatment in the cases of appendicitis and cholecystitis.

	Patients operated.	Patients reporting.	Well.	Much improved.	Not improved.
Appendicitis.....	145	93	54, or 58 per cent..	27, or 29 per cent..	12, or 13 per cent.
Cholecystitis.....	60	41	28, or 68 per cent..	10, or 25 per cent..	3, or 7 per cent.

—(E. H. H. OLD.)

DEXTER, R. Certain physical signs referable to the diaphragm and their importance to diagnosis. *Am. Jour. Med. Sc.*, August, 1915.

The diaphragm is in close relation to the thoracic and abdominal viscera, and abnormal conditions of these two regions frequently modify the physiological functions of the diaphragm, giving rise to definite physical signs. Conditions which involve the diaphragm may be divided into two classes: (1) Those which cause inflammation of the pleural or peritoneal covering, which give rise to a chain of symptoms referable to the innervation of the diaphragm; and (2) those which cause physical changes in the position of the diaphragm and modify its mechanical function.

The outer rim of the diaphragm for a space of about 3 inches is supplied by the sixth to twelfth intercostal nerves. The central portion is innervated by the phrenic nerves. Irritation of the central pleural surface will often cause pain and tenderness over the phrenic nerves in the neck and at times accompanied by tender points in the hypochondria. Pain in the diaphragm would not be noted. The pain obeys the laws of viscera-sensory reflexes of Head. In 1911 Capps reported results of observation on the distribution of pain when the diaphragm was directly irritated. He inserted wires through a paracentesis tube and made pressure on different parts of the diaphragm. The sensation of pain was found to be remote from the pressure point and the exact location of the reflex bore a constant relation to the portion of the diaphragm which was irritated. When the outer edge was irritated the pain reflex was felt in the abdomen, flank, or lower thorax. When the central portion was irritated pain was felt along the ridge of the trapezius muscle or in the shoulder. These painful areas were frequently associated with hyperesthesia.

The physical signs of breathing depend on the relative antagonistic actions of the diaphragm and scalene muscles, the latter being further aided by the intercostals. The contraction of the diaphragm sets up an inward pull on the angles of the ribs and will cause a contraction of the subcostal angle. The effect of the scalene muscles is to widen the subcostal angle. This can readily be ascertained by measurements. If for any reason the diaphragm is pushed down, the pull of its contraction will be exerted in a straight line and there will be an increased narrowing of the subcostal angle with a movement of the angle of the chest toward the middle line. On the other hand, conditions which displace the diaphragm upward will accentuate the normal upward curve, with a resulting diminution in its ability to pull against the muscles which raise the thorax and cause the normal outward movement of the subcostal angle. So in certain pathological conditions which alter the position of the diaphragm in an upward or downward direction the movements of the subcostal

angle may be of diagnostic assistance. The best way to estimate the change in the angle is to place the thumbs along the costal margin with the tips pointing toward the center. Slight changes on breathing can then be readily seen.

Cases of pericardial effusion are reported where on inspiration the left costal margin approached the median line and the right moved out normally. The serum in the pericardium had pushed down the diaphragm on the left side and given it a more direct pull. In pleurisy with effusion and in pneumothorax the same sign has been observed. The costal angle will be pulled in on the diseased side. In certain cases of old pleurisy the sign is observed. In these the pleural sinus is probably obliterated and the diaphragm has a high adhesive attachment and then will have a straight pull.

Pressure below the diaphragm will cause an increased flaring and outward movement of the subcostal angle. There have been cases in which the differential diagnosis between empyema and subdiaphragmatic abscess rested largely on the movement of the angle in inspiration.—(E. T.)

HALL, R. W. B. *An epidemic of influenza in the Island of St. Kilda.* Jour. Roy. Nav. Med. Service, 1, No. 3, July, 1915.

This is a description of an attack of influenza in apparently virgin soil among the inhabitants of a small island of the outer Hebrides group. The H. M. S. *Active* received urgent orders to proceed to the island when news was received that all the population excepting six persons were prostrated with an epidemic pneumonic in character. The exposed condition of the island is such that it is cut off from the world from September to June. The epidemic occurred in June, 1913. No previous epidemic of any sort had been known since 1724, when smallpox devastated the island, leaving only 4 adults and 26 children. The history of the present epidemic is as follows: June 12 a steamer anchored in the bay, and, as is the custom, most of the 75 inhabitants went on board and the tourists landed and mingled freely with the natives. The steamer sailed at midday, and late at night of the same day some natives became sick. On the following days large numbers were attacked, until the entire population, with the exception of six, were affected. The six immune were elderly and could not assist the sick. The condition was pitiable. There was an abundance of food but no one to prepare it. There were many cows which had not been milked for several days. The naval surgeon made a diagnosis of influenza, pneumonia not being present. All the sick seemed to have the same symptoms—sudden onset of frontal headache, great pain in the eyes, hot skin, dry mouth

with hard dry cough, pain in all muscles and joints, and complete prostration. Temperature ranged from 99° to 104°.

This epidemic was probably the effect of the introduction of an infection in nonimmune soil. All recovered.—(E. T.)

GOODALE, J. L. Pollen therapy in hay fever. *Boston Med. and Surg. Jour.*, July 8, 1915.

This is a report of observations based on 123 cases of hay fever treated experimentally with pollen extract. A large variety of pollen were used in order to find the biological relation of the various plants.

The extract was made by soaking the pollen in water for several hours. The grains promptly swell and yield their albuminous contents to the water. The simple water solution deteriorates and 15 per cent by volume of alcohol must be added which will prevent any change for at least a year.

A preparation of a definite percentage stock solution of the pollen extract is impossible and also unnecessary because individuals differ so widely in their degrees of sensitization. The proper dose must be determined by experiment in each case by gently rubbing in a drop of pollen extract of various dilutions on superficial skin scratches. In about fifteen minutes positive reactions are indicated by varying degrees of local disturbances. In a pronounced reaction there is a slight swelling rather white in color surrounded by an area of hyperemia. There will be some itching. The intensity of the skin reaction does not always parallel the clinical symptoms.

It seems that almost any pollen may cause hay fever but the early bloomers do not cause much discomfort. The chief causes are the grasses and compositae which bloom in the mid-season and fall. The pollen extract is injected subcutaneously and not into the muscles.

The dosage is determined as follows: Skin tests are made until the particular exciting pollen is found. Then a series of tests are made with different dilutions of the pollen extract. It is important not to apply these subsequent tests in the vicinity of the skin which has been reddened by the first positive reaction, as there will be increased excitability in the region and a simple scratch may cause an urticaria.

The initial subcutaneous dose should be of the dilution that just fails to excite a definite skin reaction. The first injection should be postponed until the reaction from the skin tests has subsided. The dose should be 5 or 10 drops of the proper dilution, and the only result should be a slight smarting from the contained alcohol. Injections may be made at intervals of two days to a week, increas-

ing by a few drops only, in order to avoid any anaphylactic disturbances. After five or more injections have been given the dose may be increased more rapidly by using less diluted solutions. A proper dose should raise a small, well-defined lump, with a sensation of moderate heat and itching.

Instances of harmless anaphylactic shock have been observed after doses of ragweed and dandelion extract. It is a wise precaution to start with a dose one-tenth of what the patient can theoretically receive.

The good results of treatment are shown in the diminution and disappearance of any skin reaction and the personal feeling of the patient. One hundred and twenty-three cases have been observed, but not all had a satisfactory treatment. About one-fourth experienced such striking diminution in their symptoms that the treatment must be given credit for the change.

Biological studies have been made to determine the relation of protein of pollen of family groups of plants in order to see if the extract of one particular plant is potent against others of the same family. It was found generally true that such was the case. In other words, injection of extract made from one species of grass would protect against other grasses. It is not true of different families, as Clowes showed in 1913 that in individuals sensitive to both grasses and ragweed, immunization against the former conferred no protection against the latter.

Sero-biological experimental methods were employed. Pollen extract was injected into rabbits at intervals of several days. In time the serum of some would become potent and prove itself by precipitation and agglutination.—(E. T.)

HOWELL, W. H. *Studies in bronchial glands.* Am. Jour. Dis. Child., August, 1915.

This is an investigation to test the growing opinion that chronic adenitis of the bronchial glands is always tuberculous. A large number of children, sick and well, were examined with care. Over 300 were infants under 2 years of age in a hospital which admitted all diseases except contagious. Five hundred school children between the ages of 6 and 12 are also included in the series, as well as some private cases.

The means used to demonstrate enlarged glands were auscultation, percussion, and X-ray examination. Auscultation was employed to determine a sign described by D'Espine. The D'Espine sign is the point on the vertebral column where the whispered voice changes

from a vesicular to a bronchial character. D'Espine stated this change occurs at the seventh cervical. In infancy the whispered voice can not be obtained, but the sounds made by increased breathing after crying do as well. The author places the critical point of the sign lower than the seventh cervical and accepts as a positive D'Espine a change in character of whispered voice or expiration sound at the third dorsal vertebra.

Percussion of glands is very difficult. Dullness to the left of the sternum and spine is masked by the heart and great vessels. But dullness in the second interspace to the right of the sternum and dullness to the right of the vertebral column at the level of the spine of the scapula is significant and agrees pretty well with the D'Espine sign.

The X-ray was used as a check and in no case of positive physical finding did the roentgenogram fail to show a shadow. Finally enough cases came to post-mortem to prove the reliability of the D'Espine sign.

Acute adenitis of the bronchial groups of glands was not considered, as the sign rapidly disappeared with the subsidence of the parent disease. The glands of the trachea drain the upper regions while the hilus glands drain the lungs. Both sets, however, give positive D'Espine, the hilus glands more commonly giving dullness.

The author states that all cases entering the Infants' Hospital since July, 1914, who have no history of recent acute infectious disease of the air passages, showing positive D'Espine and interscapular dullness with or without lung signs, have proved to be tuberculous.

The above was true of infants under 2 years of age, but the author proceeded to study older children where the sign did not appear to be so conclusive, as he had watched children with a D'Espine sign and a bad, dry, brassy cough and had seen all signs disappear after removal of adenoids. Five hundred and five presumably well school children were examined. One hundred and twelve, mainly the younger ones of 6 to 8 years, had positive D'Espine sign. At these years there were complicating defects such as carious teeth, adenoids, and bad tonsils, and if these cases had chains of enlarged glands down the neck they showed positive D'Espine.

For purposes of diagnosis it is well to separate the glands up and down the trachea and those at the root of the lungs. Inflammation of both sets will give a positive D'Espine, dullness accompanying those at the root of the lungs, but not with glands down the trachea unless there is also consolidation at the apex. The upper set of glands become enlarged from draining the teeth, tonsils, etc. They give a narrow chain which is sufficient to transmit the bronchial breathing sign but does not give dullness.

The author concludes that a positive D'Espine with interscapular dullness mean thickening at the roots of the lungs, which in infants spells tuberculosis, and in older children, if accompanied by malnutrition and anemia, probably indicates tuberculosis.—(E. T.)

LYONS, R. Mode of action and use of emetin in endamebiasis. Am. Jour. Med. Sc., cl, No. 1.

Ipecac and emetin when taken by needle or by mouth act through absorption into the blood stream and exert their specific effect only on those endamebas within reach of the circulation—that is, in the tissues—otherwise the endamebas, which are simply harbored in the intestines, would be destroyed.

The nonpathogenicity of the colon endameba is due in all probability to the fact that it does not penetrate the intestinal mucosa.

This explains why neither ipecac nor emetin, orally or by needle, has any effect upon them. By analogy the pathogenic endamebas which are free in the intestinal canal should remain unaffected by our specific medication and cause no symptoms. Such is found to be the case in the carrier state. Finally, the amebicidal action of ipecac and emetin is limited, then, to amebas in the tissues. When these are all destroyed the lesions heal with remarkable rapidity and the patient is cured.

Relapses in most instances are due to the fact that some of the amebas escape destruction by encystment. In this stage they are resistive to any form of medication and produce little, or at times, no local irritation. From careful histories, taken in about 80 cases of amebic dysentery, Lyons noted that in the majority of cases, even in periods of improvement or apparent well-being, the patient usually admitted that he experienced some slight abdominal discomfort or unnatural feeling in spite of the fact that the stools were apparently normal.

This leads him to believe that in the majority of cases some of the cysts remain embedded in the tissues of the colon and are not simply harbored in the large intestine in the same manner as the *Endameba coli*, for if such were the case there should be complete absence of symptoms in the intervals of remission. The relapse takes place then when conditions are favorable for the encysted forms to again become vegetative.

In the carrier state it would appear, however, that conditions are somewhat different. Here the individual who is a menace to the community is himself apparently immune to the organism which simply lives in his intestines. What it is that protects the intestinal

mucosa in such a case from penetration by the parasite is not known, but this fact constitutes the essential difference between the two states.

MODES OF ADMINISTRATION.

There are at the present time four routes by which emetin has been introduced into the body—the subcutaneous, the intravenous, the oral, and the rectal.

THE SUBCUTANEOUS AND INTRAVENOUS ROUTES.—The intravenous route is only necessary in exceptional cases and does not differ from other intravenous injections.

With regard to the subcutaneous injection of the drug, there are several facts to be borne in mind: (1) The alkaloid emetin is slightly irritating, and (2) the hydrochlorid is slightly acid in reaction.

Where a small dose ($\frac{1}{4}$ gr.) is injected, both of these factors are negligible, as the product is rapidly absorbed into the circulation. On the other hand, if a large dose (1 gr.) is administered, considerable local pain and inflammation results, owing to the concentration of the factors just mentioned. Intramuscular injections cause still more discomfort. The inflammatory reaction thus produced at the site of injection may persist as an infiltrated area from one to two weeks. It is more than probable that such a reaction seriously retards the rapid absorption of the drug.

For these reasons, where prompt and lasting effect is desired, small repeated injections are far preferable to large single doses.

ORAL ROUTE.—When emetin is administered by mouth it is highly probable, from what has been previously stated, that the drug is absorbed into the blood stream in the small intestines and is not eliminated by way of the colon in the fecal matter. It is generally taken in salol or keratin coated pills. It usually produces considerable gastric and intestinal irritation.

There is sufficient evidence at the present time to state that emetin should be given by mouth only when hypodermic methods or ipecac is contraindicated.

COLONIC ROUTE.—The practical value of solutions of either emetin or ipecac for colonic irrigation is problematical. There is considerable intestinal irritation due to the direct irritant action of emetin.

DOSAGE AND DURATION OF TREATMENT.

For an ordinary case of amebic dysentery in an adult an average of one grain daily is sufficient. Mild cases may get well on less and severe cases may require more. Lyons has yet to see, however, a case that required more than two grains daily, provided the principle of repeated small injections was followed. Experience has shown that

it is better to continue the injections, as Dopter advises, for four or five days after the stools are apparently normal. Careful and systematic examination of the stools will be found to be one of the best guides to therapy.

In general the duration of the treatment is from one to two weeks.

It is seldom wise to prolong the administration of the drug beyond two weeks, even though a diarrheal condition exists, unless active endamebas are still present. The diarrheal condition may be due to an intestinal catarrh or an association bacillary infection, or possibly to the drug itself.

During the administration of emetin, moderate purgation with castor oil or a saline is often beneficial.

ILL EFFECTS OF EMETIN.

Ill effects are rare, unless the dose is large or the treatment prolonged. Weis has observed peripheral neuritis in two cases following emetin, and believes it to be due to the use of too large doses. Spehl and Colard report a case that had been given one grain for six days, and then the dose increased to one and one-half grains daily. After a few days the patient developed a flaccid paresis of all muscles. There was edema of the face, rapid pulse, and diminished tendon reflexes. Recovery was slow.

The evidence is increasing to the effect that the drug is not as harmless as generally supposed and that large doses are not without danger.—(E. L. W.)

MEDALIA, L. S. The treatment of eczema with special reference to the use of vaccine and the part played by bacteria in its etiology. Report of 50 cases. Boston Med. and Surg. Jour., 1915, clxxiii, No. 6, pp. 187-197.

The author summarizes his observations as follows:

Eczema in its primary stages is in reality a dermatitis, the exciting cause of which may be any external or internal irritant capable of exciting a dermatitis.

The "necessary something" or the "unknown quantity" in the etiology referred to in the textbooks responsible for changing the dermatitis into a true eczema is the secondary bacterial invasion of the dermatitis.

The absence of bacteria in the primary or dermatitis stage of eczema and the abundant growth obtainable from the secondary or true eczema lesions, together with the clinical response to the autogenous vaccines, all fairly well substantiate the etiological relation of bacteria to this disease.

Staphylococcus aureus is the organism always present in eczema, at times mixed with streptococcus and rarely mixed with *Staphylococcus albus*.

The general condition, food idiosyncrasies, habits, and occupation of each individual patient should be carefully studied in order to eliminate if possible the exciting causes of the dermatitic lesions.

Ointments, powders, and other topical applications, though temporary in effect, are necessary adjuncts to the vaccine treatment to protect the raw skin and help to relieve the patient's discomfort.

The presence of the streptococcus should always be kept in mind, and when found a separate autogenous vaccine should be prepared therefrom.

The use of large doses—6,000 million organisms or over—of the autogenous staphylococcus vaccine was found necessary for the successful treatment of this disease.

Vaccine treatment, more especially the use of autogenous vaccine, when administered in the proper doses, yields by far the best results in the treatment of this intractable disease—eczema.—(R. C. R.)

SUDO, M. Study of diseases of stomach and duodenum by X-ray. Sei-i-Kwai Med. Jour., July 10, 1915.

The author described the histories of 69 cases examined by X-ray and verified by operation, and after carefully studying them, together with cases previously reported, came to the following conclusions:

The X-ray diagnosis of stomach and intestine is not only more certain than other methods in showing the conditions of disease from clinical aspect, but it is, moreover, able to demonstrate hourglass shape, nonpalpable carcinomatous tumor, perforative ulcer, etc., which can not be ascertained by other methods.

There are many causes bringing about mistakes in X-ray diagnosis. So you must pay great attention to various clinical symptoms and must not make a hasty diagnosis.

The absence of shadow in X-ray diagnosis of stomach cancer is very important, and its shape shows some peculiarities, according to varieties of cancer. The position and size differ somewhat from its real position and size. But the absence of shadow only is not really diagnostic of the presence of tumor, because it may be present in other diseases of stomach, etc.

Early diagnosis is still impossible.

In cancer of pyloric end and its near neighbor the discharge from stomach is generally delayed.

The cancer of pylorus and its near neighbor often causes the dilatation of parts below the tumor.

The differential diagnosis between malignant and benign pyloric stenosis is often very difficult if there is no marked or palpable tumor, but the balloon-like dilatation of pylorus and strong, slow peristalsis generally denote benign stenosis.

The constriction in cancer of cardiac end and its resultant hour-glass stenosis can be seen sometimes and helps diagnosis.

The cancer very rarely extends over the pylorus into the duodenum, but in cardiac end it often invades the esophagus. Such secondary esophageal cancer is difficult to distinguish from primary one by other methods, but by X-ray you can see some differential points.

By X-ray examination you can comparatively accurately settle the advisability of operative treatment.

There is no special sign of duodenal ulcer or stenosis, but if there be right-sided position of pylorus, strong, active peristalsis, long-continued presence of duodenal and localized tenderness, you can be almost sure of diagnosis.

Duodenal ulcer and gallstone X-ray shadows are similar and often cause trouble in differentiation.—(R. C. R.)

INOUE, G., and HAMANISH, S. Cure and recurrence of syphilis. *Sel-i-Kwai Med. Jour.*, July 10, 1915.

The authors treated over 1,780 cases during five years with new and old salvarsan and made comparative study of superiority of various injection methods. The joint use of salvarsan and mercury for early syphilitic patients is generally attended with satisfactory result, but even then about 30 per cent are incompletely cured or show recurrence. Still, if we compare this result with that of simple slight salvarsan injection, the curative percentage shows a great superiority. In those early syphilitic cases treated with venous injection alone there appeared 70 per cent of recurrence and incomplete cure.

Again, in early cases treated with subcutaneous injection of even only 0.6 gm. the results obtained during three years after injection are far better than venous injection, but for advanced syphilis the results are quite opposite and the recurrence more often occurred in subcutaneous than in venous injection. The latest use of salvarsan and mercury together seems to be better than any method so far adopted, but in certain cases it can not be conducted or has to be discontinued. Even in cases satisfactorily treated the percentage of cure shows only 70 per cent, and we must make further effort for more complete method. As regards the new salvarsan, they consider it somewhat superior to old salvarsan.—(R. C. R.)

MENTAL AND NERVOUS DISEASES.

R. SHEEHAN, Passed Assistant Surgeon, United States Navy.

MEYER, A. *Differential diagnosis of general paresis.* Tr. Am. Medico-Psychol. Assn., 1914.

The diagnosis of general paresis aims at the singling out of the cases of a diffuse progressive parenchymatous syphilis with preponderance of the loss of tangential fibers and other nervous structures, with neuroglia overgrowth, disorganization of the lamellation of the cortex, an infiltration of the sheaths of the small and medium vessels with plasma cells and lymphoid cells, and occasional local devastations. General paresis is an invasion of the brain by spirochetes with a parenchymatous reaction, and a more or less incidental mesoblastic response (Weigert).

By the diagnosis of "dementia paralytica" we mean thereby the distinctive formulation of facts which are clinched by the concept of progressive parenchymatous syphilis of the brain, in distinction from other progressive reductions of the brain and conditions resembling such a process, or in distinction from processes which are not progressive and perhaps not even evidence of a distinctive brain damage. The problem becomes most difficult where we deal with processes also on a luetic basis, but with a different type of lesion; the diffuse luetic meningitis and gummatous processes; the luetic vascular affection of the smaller vessels; and the tabetic conditions with nonparalytic psychoses. It also creates considerable perplexity when we deal with a patient with evidences of syphilis and symptoms of neurasthenia, arteriosclerosis, senility, epilepsy, alcoholism, multiple sclerosis or functional psychoses, such as maniac-depressive cycles or excitement and toxic psychoses. In these latter cases it is decided by the characteristic disorganization of the personality and the cardinal findings in the cerebrospinal fluid. In importance these latter rank as follows:

(a) Complement fixation with various antigens.

(b) The gold chlorid reaction, if it involves the total discoloration of the first five dilutions, and relative discoloration of the dilutions 6, 7, and 8.

(c) The presence of globulin either in the form of the first phase of the Nonne-Apelt or with Noguchi's butyric acid test or the Ross Jones test.

(d) The presence of more than 10 or 12 cells per c. mm., especially where there are plasma cells and no leukocytes.

Of all these the colloidal gold reaction would seem to offer the most distinctive findings.

(2) The findings by brain puncture represent too radical a measure for routine use.

(3) The "cerebral symptom-complex" of general paresis is conclusive where diffuse cerebral symptoms and certain eye symptoms combine with the specific paralytic signs. The eye symptoms, irregular and sluggish, and especially Argyll-Robertson pupils, are most helpful.

The speech disorder.

The writing disorder.

Tremor.

Difficulty of coordination and of relaxation and overflow.

Innervation.

Exaggeration of tendon reflexes with ankle-clonus, but relatively rarely with Babinski's sign, at times with a combination of exaggeration of reflexes and hypotonia.

(4) More or less typical cerebral attacks of the character of apoplecticiform or epileptoid reactions, usually appearing in the form of status, with prolonged coma and with varying but usually not lasting Jacksonian or focal symptoms, occasionally epileptoid states of bewilderment and amnesia or fugues, rarely clean-cut epileptic attacks.

(5) Evidence in the mental functions; progressive loss of memory, changes of the personality, indifference to the discrepancies of dates and memory, lapses of behavior, variable emotionality and suggestibility, euphoria, and certain superimposed reactions of predilection, such as the exalted polypraxia or the absurd hypochondriacal states. It is specially important to realize that there is no symptom-complex from "neurasthenia," hysteria, delirium to manic-depressive and paranoid reactions which would as such exclude the possibility of paresis. On the other hand, a number of these can be complicated by signs of nervous instability which might simulate general paresis.—(R. S.)

ABBOTT, E. S. **What is paranoia?** Tr. Am. Medico-Psychol. Assn., 1914.

In a brief review of the conception of paranoia, which subject has been much discussed of late, the writer concludes that unless the term is used merely in a symptomatic or descriptive sense (in which case it is an unnecessary synonym for the old delusional insanity), paranoia is a psychosis, but not a disease process. It is neither a pure affect-psychosis nor a pure ideation-psychosis, but rather a combined associational affect-ideation-psychosis. It is a continuous self-perpetrating faulty association of ideas and affects without disturbance of the thinking or affective or conative processes as such. It is purely functional, but not related to the manic-depressive or dementia precox psychoses, which are ordinarily, though to my mind wrongly, called functional. Hence it does not lead to dementia, except in the

sense above mentioned, which is merely in the line of its own evolution, and it does not necessarily have any of the symptoms of the other psychoses except delusions, which may occur in all of them. Its mechanism is that of prejudice, but the basal complexes involved are very intimate and personal ones with correspondingly strong and durable affects.

This conception gives some therapeutic hope.—(R. S.)

WATERS, W. H. **The cerebrospinal fluid in diagnosis and in treatment.** Boston Med. and Surg. Jour., July 22, 1915.

The writer completely reviews the present status of the knowledge of the subject.

He concludes that lumbar puncture is a relatively simple and safe procedure when properly performed. Examination of the fluid removed should include chemical, microscopical, and serological tests. By examination it is usually possible to recognize with certainty and to differentiate the various forms of infectious meningitis. Repeated lumbar puncture is not infrequently of definite therapeutic value in such cases.

The cerebrospinal fluid should be carefully studied prior to discharging as cured any case of syphilis, irrespective of the stage in which it has been treated. Examination of the fluid is essential in properly following treatment in cases of syphilitic involvement of the nervous system.—(R. S.)

OSBORNE, O. T. **Raynaud's syndrome; Raynaud's disease.** Am. Jour. Med. Sc., August, 1915.

In a review of a number of cases the writer summarizes the subject as follows:

Raynaud's disease is not a distinct entity; it is a syndrome caused by the disturbance of one or more internal secreting glands.

There is primarily no real disease of the blood vessels, but the vasomotor control is so abnormally disturbed that most contraction of certain blood vessels may occur in different parts of the body, perhaps more or less coincident with abnormal dilatation of other blood vessels. If the contracted blood vessels are peripheral the parts more or less lose their function and show various trophic disturbances.

This blood-vessel spasm may occur in the internal organs of the body as well as peripherally, though much less frequently and more difficult of diagnosis.

The syndrome is probably due to disturbance of more than one of the ductless glands of the body that have internal secretion, but there

is always apparently some disturbance of the thyroid gland, perhaps a diminution of the vasodilator material of this gland.

Judiciously applied, thyroid treatment improves the majority of cases, perhaps all, and cures some cases. Nitroglycerin is always of temporary benefit, and local heat is always of immediate benefit.—(R. S.)

POTTS, W. A. What tests in childhood are best calculated to throw light upon the capacities of mental defectives for future work. *Lancet*, London, June 17, 1915.

The writer thinks the greatest importance can be attached to the opinion of an experienced physician who has some knowledge of psychology and experience in social work. Any rule of thumb method is fallacious. The tests should be put in use on a large scale and the results noted in 10 years' time. Before giving a verdict it is necessary to have a record of the subject's school attainments, particularly in regard to manual work, and his rate of advance in the last two or three years as measured by the Binet scale, in addition to the social and medical record of the family.—(R. S.)

SMITH, M. H. The Binet-Simon method and the intelligence of adult prisoners. *Lancet*, London, July 17, 1915.

This paper is based on work done by the writer as medical officer of Stafford Prison. The writer concludes that the method needs modifications for application even to young adults. Feeble-mindedness can not be decided without a complete clinical study of all the factors in the case, of which factors the degree of intelligence is but one. Failure to reach any given standard of intelligence is not of itself sufficient reason for regarding a subject as feeble-minded. More work with the method is needed upon young adults of all classes in order to attain a uniformity of method.—(R. S.)

SURGERY.

A. M. FAUNTLEROY, Surgeon, and E. H. H. OLD, Passed Assistant Surgeon, United States Navy.

CREE, G. Medical narrative of the arrangements of the first division at the battle of the Aisne. *Jour. Roy. Army Med. Corps*, London, xxiv, No. 3.

This interesting paper covers in detail medico-military operations on such an extended scale that the following is simply a reference to those points which would seem to be of special interest to the medical officer serving with a comparatively small unit, e. g., the regiment or brigade.

Dressing stations.—The location of each station was left entirely in the hands of the officer commanding the bearer division, the latter, of course, reporting what he had done. "It appears that with modern shell fire it is impossible to find places sufficiently advanced to be really useful that are protected from it. Indeed, so far we were unable to even find places for the divisional collecting station that were out of range of the heavy guns, and the Château at Villers the last day we were there and the industrial school at Ypres both had high-explosive shells through them, fortunately without much damage. So I may say that if it is supposed that dressing and collecting stations are to be selected so far back as to be safe from shell fire they would be so far away as to be useless for their purpose."

Health of troops.—The health of the division was very good, "and at no time could it be said that sickness in any way hampered the troops. On one day only did the sick exceed in number the wounded." This record seems the more remarkable since it appears that some or all of the troops had not at first been protected by anti-typhoid inoculations (which were carried out in the field), the same ground had been occupied for several weeks, ground that was intensely cultivated and highly manured, full of organisms, as exemplified by tetanus and spreading edema, and the men "had had a very hard time of it, a long, exhausting retirement, followed by severe fighting in the trenches."

Feeding the wounded.—Rations for the wounded were supposed to be drawn from their own units. This was found to be impossible in practice, and actually a certain percentage of rations from each brigade group was drawn direct from the supply column.

Disposal of arms and ammunition of the wounded.—"At first all the arms and equipment were handed over to the ordnance officer and the ammunition to any passing unit or to the ammunition column, but this had to be modified. The slightly wounded took their arms and equipment with them to the clearing hospital and only that of the seriously wounded was handed over to the ordnance officer. This was found necessary, otherwise the lightly wounded who returned in a few days to their units were, if their arms, etc., had been handed over to the ordnance officer, without the necessary means of fighting, and the units kept no surplus stock. It soon became known, too, that ammunition and arms could be found at the collecting station, and units used to apply there for them."

Stretchers, blankets, and clothing.—These articles went rapidly from the front and tended to remain there without replenishment. Later, arrangements were perfected whereby each article sent down was promptly replaced by one sent from the rear by motor convoy.

Motor vehicles.—Throughout this paper there are many references which indicate clearly the constant use and invaluable service

rendered by motor ambulances and supply wagons. We have become so accustomed to these vehicles as a means of transport in daily life that it is perhaps difficult to realize that their tremendous influence in military operations is in actual warfare almost as novel as that of the aeroplane.

Collection of wounded at the front.—It was impossible to lay down hard and fast lines. The lightly wounded found their way in almost as soon as hit and the more serious cases were brought in by the regimental stretcher bearers as soon as possible. The “debatable land” between the trenches was always a bugbear and it was often impossible to render aid to men who were badly wounded between the two lines of fire. “On many occasions we spoke about this to the general staff, but it was always decided that it was impossible except at the cost of many lives, so it had to be given up.” Even at night the work was extremely difficult; if clear, “the slightest signs of concerted movement led to an outbreak of firing,” while on dark nights “the absence of lamps hampered the work, and even the use of electric torches would draw fire.”

In conclusion the writer well observes that “the real work of the regimental medical officer must be left to him to devise in actual fighting conditions, and, once the difficulties are realized and thought over, that important factor, initiative, will do the rest.”—(T. W. RICHARDS.)

PANNETT, C. A. *The medical aspects of modern warfare, with special reference to the use of hospital ships.* Brit. Jour. Surg., ii, No. 7.

The writer's observations are drawn from personal experience on the *Liberty* (formerly a steam yacht) while this vessel was actively engaged in transporting wounded soldiers from France to England, and also, apparently, in connection with certain naval operations. He deprecates the idea, held by some, that such “carrier ships” should simply collect the wounded and convey them to the nearest base hospital for surgical interference. Delays are disastrous, and such hospital is not always at hand or may be already overtaxed. Indeed, hospital ships served to great advantage as base hospitals in the north of France when fighting took place near the coast, and it was not always advisable, for military reasons, to establish base hospitals ashore. Moreover, hospital ships “proved more efficient than many land hospitals so hurriedly fitted out, where the absence of sterilizing arrangements and of an X-ray apparatus has been keenly felt.” On the ships steam and electricity are always available and necessary apparatus is readily installed.

The writer advocates certain novel structural features in hospital ships. Thus we are accustomed to consider the upper deck as the

most suitable location for the operating rooms, but we read that "these rooms, occupying a situation ideal from a ventilating point of view, could much more usefully have been made into wards. The operating theater is equally useful below the water line" (on the *Liberty* it was just forward of amidships, 5 feet below the water line). These observations refer, however, to a hurriedly converted vessel, in which ventilation is seldom adequate for hospital purposes, especially where many or most of the cases are septic.

The *Liberty* is driven by twin screws "which are of different pitch and rotate at unequal velocities, the object being to minimize vibration." This feature, which I have never before seen suggested, is worthy of note, because it could doubtless be applied to any twin-screw vessel, fitted out in an emergency, on which vibration proved to be excessive, though the ideal hospital ship is, of course, an oil-burning turbine, probably with electric drive. Unfortunately the writer does not inform us as to the actual results of this scheme, which in principle is that of "breaking step." It would also be interesting to know how the relative speed of the two screws was regulated. Presumably the same steam pressure would be delivered to each engine, the propellers then picking up turns which would give approximately the same thrust; otherwise the ship would tend to steer badly.

In transferring the wounded the well-known Neil Robertson stretcher was used. This is practically the Japanese model, and while simple, light, and easily applied—if such a term may be used—has been objected to in our service as tending to constrict the chest.

Destroyers appear to have been used successfully in transferring patients to the hospital ship, and the author expresses the decided opinion that the latter vessel has no place with the battle fleet. "The plan adopted by the Navy up to the present has been to transfer the wounded to high-speed destroyers after an engagement and to send them to the nearest base. The hospital ship has been warned, has met the destroyers, and cleared them of wounded. To have a movable base hospital is a distinct advantage. The two destroyers carrying back wounded from the sinking of H. M. S. *Pathfinder* were able to meet the hospital ship in the mouth of the Forth, transfer the wounded, and immediately return to their patrolling in the North Sea." Such transshipment is probably a shock to our ideals, but it is pretty much the Japanese plan, based on necessity, and it may be well for us to face actualities. The writer probably voices the opinion of every medical officer actively engaged afloat or ashore when he states that "the difficulties of properly treating the military wounded in this war appear to be almost insuperable."—(T. W. RICHARDS.)

MUMMEY, P. L. *Injuries to the bowel from shell and bullet wounds.* Proc. Roy. Soc. Med., viii, No. 2, Dec., 1914.

Injuries to the rectum or pelvic colon which occur in war, whether from bullet or shell wounds, are very serious, and statistics of previous wars show that injuries of this nature have a higher mortality than those to other parts of the alimentary canal. In the Boer War the mortality from wounds of the rectum was 30.7 per cent of those so wounded, death being due to peritonitis, internal hemorrhage, or septicemia.

A high-velocity bullet may pass through the abdomen or across the pelvis, penetrating the large and small bowel, without causing a fatal or even a serious result, providing certain conditions are present. Of these conditions the chief are: The bullet must be traveling at a high velocity; the intestines must be nearly empty of fluid contents; the proper first-aid treatment must be administered. The Boer War taught that the best results were obtained by giving complete rest to the intestines for 48 hours after the injury. These conditions were best obtained by giving morphin in full doses, withholding all food, and providing as much rest as possible.

Wounds involving the bowel should not be treated by immediate operation, even if proper surgical facilities are available. Surgical treatment should be reserved until later for the treatment of secondary complications.—(L. W. JOHNSON.)

KEITH, A. *Account of six specimens of great bowel removed by operation; observations on motor mechanism of colon.*

BARCLAY, A. E. *Roentgenologic studies of large intestine.* Brit. Jour. Surg., ii, No. 8.

In a number of contributions on various aspects of the broad subject of intestinal stasis the main surgical interest is contained in sundry incidental observations. Extracts having to do with the ileocecal region have been selected from two of the articles principally because our knowledge of the functioning of the ileocecal region is as yet too meager to permit of any progress in the surgical treatment of stasis except by the crude method of trial and error, and hence any accretions to our knowledge of the region are invaluable to the surgeon as furnishing a basis for rational and sound advance.

Keith: Proceeding from the study of the "nodal" structures in the heart, Keith sought and found a neuro-muscular junction at the terminal portion of the ileum, and he believes that Auerbach's collar, which surrounds the ileocecal junction, is "nodal" in its true nature; that it is the tissue in which cecal and ileocecal movements

normally take their origin, and it is through this tissue that the central nervous system exercises its control over such movements. (The teaching of recent physiological studies concerning the correlated action of the pyloric and ileocecal sphincters.) He continues: "I am convinced that in the great majority of cases which are classified under the somewhat elastic term of intestinal stasis the symptoms do not result from an atony of the musculature of the bowel, but from a hypertonicity of those parts which are normally in a state of tonic contraction—such tracts as the terminal part of the ileum.

"I have studied closely X-ray photographs taken of cases of intestinal stasis in various stages of a bismuth meal, but I have not succeeded in finding one in which there was a clear cleavage of a bismuth mass due to pressure or traction of a peritoneal band. * * *

"The X-ray pictures of obstruction are not such as we should expect from this method of constriction of the bowel, but are exactly what we should look for in a case of hypertonicity of the terminal ileal sphincteric tract. The X-ray and anatomical evidence is altogether against the theory which regards peritoneal bands and kinks as the cause of chronic obstruction of the bowel, and altogether in favor of a disordered action of the intestinal musculature."

Quoting Barclay: "It is the mechanical factor of digestion that is to-day passing in review * * * (whereas) investigation shows very clearly that the whole musculature of the alimentary tract is linked up by a nervous system that is probably as complex as that of the brain itself; a system subservient to the central nervous system, but also capable of automatically exercising a selective action on ingesta, of calling secretory glands into activity, of preparing the tract for the food that is coming (e. g., emptying the ileum when food is taken into the stomach), and many other functions that we hardly suspect as yet. I know of no subject that opens out a wider field for investigation or one that calls for more careful and accurate observations. It bristles with interlocked problems.

"It has been shown that the food passes into the cecum in part by pressure from behind, i. e., that the ileocecal valve acts as a sphincter, and that its function is not only to prevent regurgitation, but to regulate the flow of chyme into the cecum. Ileal stasis is, up to a point, a physiological condition.

"The anatomy of the terminal ileum calls for comment; the last 4 inches look as if they were different in structure, and possibly in function, from the rest of the ileum. This portion does not pursue a tortuous course, but runs more or less straight upward and outward to the cecum. Its caliber is smaller, and the chyme forms a continuous shadow which is quite different from that in other parts of the small intestine. It looks as if the circular fibers were more

evenly developed and tonic action a more persistent feature of the muscular contraction. One believes that the whole of this terminal portion is closely associated with the sphincteric and valvular action that is ascribed to the ileocecal valve itself. * * *

"We have radiographic indications that taking food into the stomach tends to make the ileum empty into the cecum, and now I have a series of cases that indicate another type of connection, i. e., a definite ileopyloric reflex, back from the terminal ileum to the stomach. (See Aaron, C. D.; Jour. A. M. A., May 29, 1915, p. 1845.)

"Lane's kink I have not recognized radiographically, and I am far from convinced that it is a cause of either ileal stasis or of this 'ileo-pyloric reflex.'

"The mechanism (of the movements of the large intestine) appears to be: (1) a relaxation of the tonic action of the muscular coats, followed by (2) a big peristaltic wave that sweeps the whole contents along *en masse*. This movement probably occurs some three or four times a day. * * *

"One finds widely ballooned colons and greatly narrowed colons—that is, apparently atonic and hypertonic types—and these have been described as the causes of constipation; but I doubt whether they are. Rather, I would suggest, they indicate the condition of the colon between the (mass) movements, for I happen to have seen the 'mass' movement sweep the shadow along both types of colon, and in both the movement was perfectly effective in displacing the contents. The part played by the cecum is not clear, but if my deductions are correct, this portion of the large gut has a separate mechanism * * * for mixing the contents and feeding them into the ascending colon, preparatory to the occurrence of the 'mass' movement."—(H. W. SMITH.)

NEWMAN, D. **Symptomless renal hematuria arising from tumors, aneurysms in the renal pelvis, calculus, and early tuberculosis.** Brit. Jour. Surg., ii, No. 8.

The author calls attention to certain conditions which may present no symptoms or physical signs beyond the appearance of blood in the urine.

1. Renal varix.
2. Passive hyperemia from pressure on the renal veins.
3. Small growths in the substance and in the pelvis of the kidney.
(a) Angioma; (b) papilloma; (c) papillary epithelioma; (e) squamous-celled epithelioma.
4. Aneurysm of the renal artery.
5. Renal calculus without pain.
6. Early renal tuberculosis.—(H. W. SMITH.)

RUSSELL, R. H. **The treatment of urethral stricture by excision.** Brit. Jour. Surg., Jan., 1915.

Russell brings forward as a method of choice the procedure of excision formerly regarded as a measure of last resort in unusually long and dense strictures. He states that the urethra may be slit up from the membranous urethra to the meatus, the urethra thus being converted into a "riband" covered with mucous membrane. Its restoration depends on the fact that a strip of mucous membrane flanked on either side by raw tissues which tend naturally to fall together and adhere will be reconverted into a tube.

1. The membranous urethra is opened as for a perineal prostatectomy, the opening retracted, and the urethra slit up forward until the back of the stricture is encountered.

2. With a median incision the urethra is opened in front of the stricture and slit up backward toward the stricture.

3. The stricture with its surrounding mass of scar is excised, and the ends of the urethra are approximated by catgut, the segment of the urethra occupying the former site of the stricture being now represented by a flat riband of mucosa.

4. The bladder is drained by catheter inserted in the proximal urethral opening and retained for one week, the wound then being allowed to heal.

Several weeks elapse before any instrument is passed.

If necessary, in case of multiple strictures, the urethra may be slit up from the perineum to the meatus, the scrotum being divided in the raphé.

Russell employs the operation: (1) In all cases of stricture that are not easily managed by dilatation; (2) in all cases in general, in which at present internal or external urethrotomy is performed.—(H. W. SMITH.)

LEWIS, D. **Some observations on bone transplantation.** Surg., Gynec., and Obst., June, 1915.

Lewis makes some observations on the use of bone transplants, derived apparently for the most part from his clinical experience. "Compact bone dies in large grafts because its physical properties do not permit of rapid enough absorption of serum to maintain the life of the bone until the vascular circulation is reestablished. The ideal graft should contain enough compact bone to maintain the required form and give a certain amount of fixation when needed, but not so much that cellular death followed by substitution occurs to any extent. As it has been demonstrated that substitution of the compact bone takes place in greater part from the graft proper, the most active bone-forming elements, periosteum and endosteum,

should be included in the graft. The anteromedial surface of the tibia is to be preferred to the crest of the tibia as the source of the graft, for in such a graft, cut through to the marrow, there is endosteum as well as periosteum and enough compact bone to maintain the form of the graft and secure some fixation, but not as much as is usually taken in a graft cut from the crest of the tibia.

"Experimental and clinical work demonstrate that the compact bone in a bone graft is gradually absorbed and that it is replaced by new bone formed from the periosteum and endosteum of the graft. The periosteum of the bone into which the graft is inserted also plays an important rôle and should be saved and brought in contact with the periosteum of the transplant or over the ends of the same.

"(Bone grafts inserted into infected fields will live, and even if sequestrum formation occurs, necessitating operation later, they have acted as a mechanical support, preventing deformities, and the convalescence is considerably shortened. Infection introduced at the time that the graft is inserted has a much more harmful effect and the entire graft is apt to be lost.) The viability of bone grafts is especially well indicated by their reaction to infection, for involucrum and sequestrum formation occurs in infected areas as it does in normal bone.

"Bone grafts placed in cavities resulting from curettage of central giant-cell sarcomas or fibrous osteitis (bone cysts), will not survive in most cases, for the hematoma which occurs within the cavity prevents vascularization of the graft. The cavities can be closed most satisfactorily by a bone plug of some kind.

"(Statistics indicate the unreliability of the Lane plate or other foreign materials in the treatment of delayed union or nonunion of fractures. The bone graft apparently stimulates bone growth in the fragments, and the osteogenetic power of the graft aids greatly in the formation of a firm union.) The inlay graft in the treatment of old ununited or recent fractures is more satisfactory than the intramedullary splint, for the endosteum of the graft comes in contact with the endosteum of the bone and the periosteum of the bone can be sutured to the periosteum of the graft. In the intramedullary splint considerable endosteum is destroyed in preparing the medullary cavity for reception of the graft, and the endosteum is one of the important factors in bone repair.

"Compact bone dies in the graft because of its physical properties, which do not permit of rapid permeation of serum. The best bone graft contains enough compact bone to give form and maintain fixation and also contains periosteum and endosteum, from which the compact bone is substituted. Grafts taken from anteromedial surface of the tibia are to be preferred to those taken from the crest."—(H. W. SMITH.)

LEWISOHN, R. **Blood transfusion by the citrate method.** Surg., Gynec. and Obst., July, 1915.

Lewisohn describes his experimental work and clinical experiences with the citrate method of transfusion, which is probably the simplest method hitherto suggested, it being not more difficult than salvarsan injection or any intravenous therapeusis and requiring no special apparatus. He finds that the sodium citrate, when present in blood at the ratio of 0.2 per cent, prevents blood from clotting three days; that 1,500 c. c. of blood containing 0.2 per cent citrate may be injected with no symptoms resulting attributable to the citrate; and that the coagulation time of the general blood volume is not increased by the injection of blood containing citrate.

1. The usual precautions are observed in selecting the donor.
2. The cannula should be of large size, to insure freedom from clotting until sufficient blood has been obtained. It should not be smaller than 14 or 16 B. & S. gage.
3. A 500 c. c. sterile graduate is at hand containing a glass stirring rod and 25 c. c. of a 2 per cent sterile solution of sodium citrate (sufficient for 250 c. c. of blood). If more blood is drawn, additional citrate solution is added in proportion.
4. The donor is prepared, a venous tourniquet applied, and the cannula inserted in any prominent vein. The blood as drawn is intimately mixed with the citrate by means of the stirring rod. When sufficient blood has been obtained the graduate is set aside, covered with a sterile towel.

The recipient may then be introduced into the room, or the blood may be carried a distance, if necessary, to the recipient.

5. The injection is made exactly as for salvarsan. The recipient's vein is exposed, or punctured, and a cannula introduced and attached to a glass funnel or salvarsan flask. The system should at first contain saline to guard against the ingress of air, but as soon as the flow is established the blood is poured into the flask (funnel) and allowed to enter the vein.

There is no necessity for haste, and the flow may be interrupted at will during the larger transfusions to obviate sudden overloading of the circulation.—(H. W. SMITH.)

MCDONALD, E. **Disinfection of hands and abdominal skin before operation.**

McMULLEN, C. G. **Report on skin disinfection by McDonald's solution.**

STANTON, E. M. **Sterilization of skin by McDonald's germicidal solution.** Surg., Gynec. and Obst., July, 1915, pp. 82-90.

Iodin sterilization of the skin has never been altogether satisfactory, and the popularity of the method undoubtedly depends on its ease of application rather than on its unquestioned sterilizing powers.

McDonald presents a new disinfectant for skin surfaces which has several advantages over iodine. It is efficient: its application is rapid and easy: it is nonirritant; it is active on either a wet or dry surface, and it is inexpensive. Moreover, it evaporates quickly and peritoneal surfaces need not be protected against contact with the skin.

McDonald's solution has the following composition:

	Parts.
Acetone (commercial)	40
Denatured alcohol	60
Pyxol	2

The active agent, pyxol, is a dark liquid, extracted from coal-tar creosote, which forms a white emulsion with water, and a light reddish-brown solution with alcohol and acetone. Its germicidal efficiency is twenty times that of phenol. Its action is not impaired by pus, soap, serum, and other albuminous matter. Pyxol itself is composed of 40 per cent pyxol oil, 30 per cent neutral hydrocarbon oil, and 30 per cent saponified vegetable oil.

Method: Preliminary washing with soap and water is of no advantage. "In conclusion, it is to be advised that the hands be disinfected before operation by immersion in this solution for one minute with the aid of a nail brush and a gauze cloth. By this means more complete disinfection may be obtained than by any other known method. The solution is unirritating to the skin and efficient. It may be used repeatedly. In the sterilization of the skin of the abdomen it is rubbed on for two minutes before operation after the patient is under ether without any preliminary washing. It speedily evaporates from the skin."

McMullen and Stanton confirm McDonald's statements. The former, however, differs somewhat in his disinfection technic. "The field of operation was prepared, if possible, the evening before operation, by shaving and washing with green soap, water, and alcohol. It was covered with a dry sterile towel and left until the next day. At operation site was treated by rubbing with McDonald's solution for about two minutes. The hands of the assistants and operator were prepared by scrubbing with soap, water, and alcohol, followed by two minutes' treatment with McDonald's solution."—(H. W. SMITH.)

SMITH, F. D. Periosteal regeneration of bone. Surg., Gynec. and Obst., May, 1915.

Since bone transplantation has come into such general favor, there has been much discussion as to the importance of the periosteum in securing the viability of the transplant. Smith reviews the literature concerned with the question, citing the conflicting views of the various experimenters, ranging from those of Macewen, "It (the

periosteum) has no osteogenetic function," to those of Carrel, who was able to reproduce bone from periosteum after it had been grown in his special medium.

In seeking a reason for this extreme divergence of opinion, Smith took his clue from Adami: "We are not yet prepared to accept those (Macewen's) views, holding the opinion that these observers have dealt only with the outer fibrous layer and not with what may be termed the 'Cambium,' or mother-cell layer, in immediate contact with the actual bone."

In following this line he has made observations, that if not new are clinically important, concerning the anatomy and histology of the periosteum.

Anatomy.—Many blood vessels traverse the periosteum, enter the compact bone through Volkmann's canals, and reach the marrow substance, communicating with branches from the nutrient artery. The periosteum also furnishes the blood supply to the cancellous bone, the branches of which ramify in the cavities of the spongy bone. (McWilliams does not ascribe great osteogenetic properties to the periosteum, but states that its presence influences the viability of transplanted bone, in that it renders the transplant more easily permeable by surrounding capillaries, thus insuring the early establishment of an adequate circulation through it.)

Histology.—The outer layer of the periosteum is made up of interlacing bundles of dense fibrous tissue. Directly beneath this and in contact with it is a firm fibro-elastic stratum, which in the adult is closely attached and firmly adherent to the surface of the bone. Beneath this latter stratum there is a periosseous layer of tissue consisting of small vessels, numerous small cells, and fine connective tissue fibrils. The cellular elements consist of two types—an outer layer of cells with plate-like nuclei closely packed together and an inner layer containing small oval nuclei. These two types of cells are probably dormant osteoblasts.

Microscopically there is no demonstrable line of separation between the periosteum and compact bone, and the histological components of the stripped periosteum vary with the method of stripping and to a large degree with an uncertain personal factor. Moreover, it is definitely known that the periosteum in different stages of bone development contains specific cellular elements in varying numerical proportions, and that these cellular (osteoblastic) elements are increased by either toxic, chemical, or mechanical causes. Therefore it would be expected that in experiments dealing with such a varying structure as periosteum, even though all other details were identically carried out, the results would be at greater or less variance with each other even so far as absolutely contradictory results.

CONCLUSIONS (in part).

Periosteum will produce bone.

A greater percentage of positive results will be obtained with periosteum which is stripped slowly and with an elevating action of the periosteotome than when the periosteum is quickly torn loose from the compact bone.

Fibrin is a very active stimulant to osteoblastic activity, and ample allowance should be made for satisfactory conditions suitable to fibrin formation as well as a generous supply of blood to the part provided for.—(H. W. SMITH.)

CROSBIE, A. H., and RILEY, A. **Epididymotomy for acute epididymitis as an out-patient procedure.** Boston Med. and Surg. Jour., May 6, 1915, pp. 664-667.

This is an interesting article because it presents the possibilities of the use aboard ship of such an operation where we have the facilities as well as a little better control of the patient than in the ordinary out-patient department.

After a preliminary statement concerning the causes of the inflammation, the course and termination in cases both of inflammation due to pus organisms and those due to the gonococcus, the authors take up in detail the treatment by operation and advise it even in mild cases and as an out-patient procedure. They were forced for several reasons to operate under local anesthesia in the surgical clinic of the out-patient department, allowing the patient to go home immediately after the operation.

The technic was as follows: Using a 10 c. c. glass syringe with a 2-inch needle and 20 to 30 c. c. of a 1 per cent novocain solution, to which has been added 3 to 6 drops 1-1000 adrenalin solution, the cord is infiltrated where it emerges from the external ring, the solution being injected in all directions, a little being put into the inguinal canal, and then the needle is pushed down into the globus major. The scrotum is circuminjected on the side to be operated, at a point where the scrotal skin merges with the skin of the thigh, all the way to the perineum, and then the line of incision, after which the operator waits 10 to 15 minutes. An anesthesia is thus obtained which lasts for several hours or until the patient arrives home.

A lateral incision is now made through the tunica vaginalis, with care in case of adhesions. Any adhesions are freed and the testicle and epididymis delivered. Inflammation is found usually most severe at the lower pole. Multiple punctures are made in any indurated areas and enlarged to evacuate any pus. Then washing off with salt solution, draining with gauze or rubber tissue placed lengthwise along the epididymis and brought out at the lower end of in-

cision, pushing back the testicle into the tunica, closing wound loosely with silkworm gut sutures through all layers to avoid persistence of any hydrocele, finishes the operation.

A large dressing and bandage are applied.

The patient is allowed to go home, take a cathartic, and stay in bed two or three days. The wick is removed at the third or fourth day, subsequent dressing being done in the clinic.

Pain is relieved, temperature falls, and distinct change for the better is noticed in the patient's appearance. The operation is recommended as a good surgical procedure, evacuating pus under pressure.

The authors start anterior irrigations about a week after operation and in another week posterior treatments.

It has been conceded that without operation 65 per cent of the double cases are sterile.

They reach the following conclusions: That epididymotomy gives immediate and permanent relief from pain, no recurrences occur, the course of the epididymitis and urethritis is shortened, likelihood of sterility is lessened, and earlier use of local treatment is permitted. "The operation can be safely and successfully done in an out-patient clinic under local anesthesia."—(W. E. EATON.)

GIBSON, C. L., and BECKMAN, F. Occlusion of the pylorus. *Ann. Surg.*, April, 1915.

The advisability of this step as an addition to gastro-enterostomy is not discussed, but chiefly the different methods of procedure. They believe that in certain cases of ulcer it is demanded and that the main indications for occlusion are, first, "the absence of narrowing of the pylorus in chronic ulcers," and, second, "active ulcerations of the pylorus, and more particularly of the duodenum." It is also considered advisable after closure of a perforating ulcer of pylorus or duodenum if a gastro-enterostomy was necessary. It should not be performed indiscriminately. The method adopted should be efficient, capable of being done quickly, and not adding to ordinary danger, particularly in poor risks. A point to be determined is whether a permanent occlusion is necessary, or a temporary one that will last weeks or months or until the ulcer is healed.

The principal methods discussed are:

1. Cutting away all communication between the stomach and duodenum, such as the von Eiselsberg operation.
2. Those which only attempt to produce a partial exclusion, as Bartlett's two methods.
3. Those which produce contractions of the stomach wall by various methods of suture, purse string, and torsion.

4. Those which aim to bring about compression of the pylorus from without by ligatures (Parlavecchio), transplantation of free fascial flaps (Wilms), by compression of the mucous membrane alone (Strauss), or the permanent exclusion by foreign material, such as the magnesium band described by Brewer.

1. Von Eiselsberg, after gastro-enterostomy, sections the stomach proximal to the pylorus and inverts both ends. This does not fill the requirements mentioned, as it takes as long as a pylorotomy without the advantage of having also removed the lesion. However, there is more surety of a permanent occlusion, though one of the authors saw the end of duodenum become patent after experiment in a dog.

Biondi's method consists of a vertical incision just proximal to the pyloric ring; this passes through serous and muscular coats, which are then dissected from mucosa. The tube of mucous membrane is doubly ligated and divided with cautery, the other coats then sutured over the stumps. This procedure was found difficult and prolonged.

Reichel and Dobertin section the stomach as von Eiselsberg and then perform gastro-enterostomy by anastomosing the proximal end to side of jejunum. Brun joins the proximal end to the duodenum distal to site of ulcer. These methods are difficult and liable to leakage.

2. Bartlett claims his methods are simple, take less time, and encounter fewer blood vessels than those in class 1. The first consists of partial transverse section of the prepyloric portion of stomach. The incision extends to within an inch of the lesser curvature. The cut edges are then sutured and serous coat closed over each one or together across the gap. In the second method a septum is formed across the center of the lumen of the stomach. A skewer is passed through two coats just above the greater curvature and out again through the two coats at same distance under lesser curvature. A crushing clamp is placed just below the skewer. The tissue distal to clamp is removed and coats sutured together. The clamp is removed, cut edges further strengthened, and serous coat of anterior wall closed over this. The technic is difficult and there is danger of leakage.

Girard contracts the lumen by a pyloroplasty. A transverse incision is closed longitudinally—the reverse of the Heinecke-Mikulicz procedure.

3. W. J. Mayo and Moynihan infold the walls of the pylorus with peritoneal sutures. This is considered applicable when the viscus is adherent and separation inadvisable.

Mertens suggested two methods: The first, four peritoneal sutures, two proximal to pyloric ring and two distal. These are tied and then tied together, producing a transverse and longitudinal infolding. The second is an attempt at torsion.

4. The most popular method is that of compression, especially that of Wilms, where a strip of fascia is sutured around the viscus. The fascia is obtained from the fascia lata or from the anterior rectus sheath. It should be about one-half inch wide and 3 or 4 inches long. The strip is passed around the pylorus, the muscle surface next to the serous coat, by means of a clamp made to pierce the gastro-colic and gastro-hepatic omentum. It is drawn tight enough to occlude the lumen, and the ends are sutured together; a few stitches also suture it to the stomach.

Silk and linen ligatures have been used. They are tied around the pylorus, care being taken not to strangulate. These have been found, however, occasionally to cut through the intestinal wall.

Brewer has used small bands of aluminum with success in dogs.

Hoffman divides the serous and muscular coats, sutures the fascia around the mucous membrane, and closes the outer layers over it. Strauss dissects out a tube of mucous membrane like Biondi, but instead of dividing it he constricts the tube by a band of fascia or wide tape and sutures the outer coats over this. These are impracticable on account of difficulty.

Polya and Bircher have suggested using a peritoneal band, as *ligamentum teres*, instead of fascia.

The authors performed 19 experimental operations on dogs. In three Biondi's method was used. They found the technic difficult. The first died from peritonitis; the second was successful; in the third the lumen became patent. In seven the fascial band was used. One died from distemper. In one there was complete occlusion. In five the lumen became patent, but with more or less constriction, so that only a small amount of gastric contents could have gone through. In six the silk ligature was used. Three died within four days. In the remaining three the occlusion was not complete; the silk was found embedded deep in thickened wall. In two ligation with chromic catgut was used. At autopsy, 29 and 38 days, the pylorus was found normal except for adhesions. No evidence of ligature found. In one, X-ray in 10 days showed complete occlusion. This was considered possibly a good method for temporary obstruction, but only lasts until the ligature is absorbed.

Considering experiments and review of literature the following conclusions were reached:

In those cases in which occlusion is indicated as a matter of expediency rather than actual necessity constriction or infolding with sutures is recommended. Of the former method the free flaps of fascia is preferred. In case of adhesions, when separation is inadvisable, infolding with peritoneal sutures is preferred.

The radical procedures, as von Eiselsberg's, are reserved for severer lesions. Such lesions, however, they consider would be better treated by resection.

Three clinical cases are quoted. In all a strip of fascia (from thigh in two cases and from abdominal wall in other) was used. Results were good in two; in the third there were complications which shadowed the result of operation.

Discussion.—Dr. Morris suggested dissecting out a part of the falciform ligament and using this to constrict the pylorus instead of fascia.

Dr. George E. Brewer said pyloric closure was indicated in only a few cases. He had satisfactory results with simple gastro-enterostomy. In patients suffering from recent severe hemorrhages from duodenal ulcers time was an important factor. In these he favored infolding the tissues by a ligature over a metal band; this method he tried seven or eight times on animals with success.

Dr. H. H. Lyle called attention to the necessity of providing against the sagging of the pyloric end of the stomach after the von Eiselsberg operation. He quoted a case in which such a pouch was found below the gastro-enterostomy opening.

Dr. A. V. Moschcowitz said he tried to occlude the pylorus in every case where the ulcer was situated at the pylorus or in the first portion of the duodenum and the pylorus was still patent. No method was perfect. The purpose would be served if the occlusion lasted for a certain length of time. He passes some sutures which, when drawn tight, cause a puckering and the anterior wall is pressed against the posterior. In some cases such occlusion lasted six months.

Dr. Frederic Kammerer said he had performed the von Eiselsberg operation eight times with no mortality.

Dr. George A. Woolsey said that he used the fascia flap recently. The X-ray showed the occlusion was not complete, and he did not think such was necessary.—(E. H. H. O.)

BRICKNER, W. M. Prevalent fallacies concerning subacromial bursitis. Its pathogenesis and rational operative treatment. Am. Jour. Med. Sc., March, 1915.

The author criticizes the conceptions of this condition as held by many surgeons and roentgenologists and mentions the following as being the chief fallacies that prevail:

1. That thickening of the bursal walls casts a shadow in the roentgenogram.

2. That the calcareous deposit found in many of the cases is in the bursa.

3. That subacromial bursitis often arises from vaguely conceived bacterial or "toxic" irritation.

4. That subacromial bursitis is marked by decided swelling in the deltoid region.

5. That there is a characteristic point of tenderness over the outer aspect of the shoulder just below the acromion margin, and that the absence of this sign indicates, clinically, absence of bursitis.

6. That the routine operative treatment to be recommended is "excision of the entire bursa."

The opinion expressed on these several items is based on study of over 100 cases, in 19 of which a calcareous deposit was shown by X-ray, and 7 were operated upon.

The roentgen-ray shadow.—A thickened bursal wall does not cast a shadow; if calcareous deposit is removed the shadow disappears.

The calcareous deposit.—"This is *not in* but entirely *beneath* the bursa, in or in and upon the supraspinatus tendon, or, occasionally, the infraspinatus near its insertion." Painter is mentioned as the first to record calcareous formation in subacromial bursitis. He reported finding a lime-bearing, cheesy material in the bursa in two cases. Codman reported three cases in which the deposit lay just beneath the bursa, and thought such was the condition in one he saw Painter operate upon. In the seven cases operated on by the author he found the deposit outside the bursa, and states that in adherent cases one is liable to be misled by the incision going through roof and floor of bursa at same time. In three the deposit was on the supraspinatus tendon and underneath the bursa. In four of the cases the material was "dry, gritty, and composed of rough, sand-like granules, in color and appearance much resembling shad-roe or yellow tartar when scraped from the teeth." Occasionally larger smooth bodies are found. The bodies were found by Dr. S. Bookman to consist of calcium and magnesium salts. In the other three cases the deposit was semifluid—"small and whitish in two cases, large and yellowish in one." This, in one case examined by Dr. Celler, consisted of "broken-down cellular material, many fat cells, a small amount of lime."

Roentgen-ray appearances vary. The shadow is usually near the greater tuberosity, but may be at some distance from it. It may be very small or quite large or multiple.

The lime formation may occur very shortly after injury, two cases being quoted in which it was found as early as fifth and tenth day.

In none was there calcification or ossification of the tendon. The deposit was readily removed with a blunt spoon.

In explanation of the pathology of the condition he states: "As a result of contusion or tear of the tendon, there is a formation of

granulation tissue, necrosis of tendon substance, and deposition of lime."

The etiology.—Condition is one of adult life. Bacterial or toxic origin not substantiated. Is believed to be of traumatic origin, produced by bruising the structure between acromion and greater tuberosity. The trauma is usually of mild form, such as hanging from car-strap or flying ring, weight of body on outstretched arm while scrubbing floor, forcibly abducting arm to throw a ball or strike with a stick. More marked types of trauma are falling on outstretched arm and fall or blow on deltoid. A small fracture of the greater tuberosity closely simulates the condition.

Concerning swelling.—In early stage there is probably some effusion in bursa; in later stage no swelling, and may be even flattening from atrophy.

Point of tenderness.—Diagnosis. Localized tenderness over the outer aspect of shoulder just below the acromion was found absent as often as present, and is not pathognomonic; such may be found in fracture of tuberosity, inflammatory process due to tuberculosis, syphilis, etc. The site of tenderness found most often by the author is anterior, over the lesser tuberosity; but this not considered pathognomonic. Sometimes it may be posterior, over infraspinatus.

Dawbarn's sign—disappearance of tenderness on abducting the arm—was found only occasionally.

The author's sign—pain referred to outer deltoid region on gently pressing the circumflex nerve against the inner aspect of humerus—also only occasionally present.

Limitation of abduction and internal rotation a striking feature in typical cases. This, however, not constant.

Diagnosis in large number of atypical cases made by careful history; inquiry concerning trauma; consideration of incidence, location and radiation of pain; inspection of shoulders; test of movements; exclusion of arthritis, cervical rib, bone inflammations, true brachial neuritis, forms of disability other than bursitis, and roentgen-ray examination.

A roentgenogram may show the pain is due to periostitis, tuberculosis or syphilis of head of humerus, or a fracture, and not to a bursitis. Or it may show calcareous deposits. A normal looking picture does not exclude a bursitis without lime deposit.

"Excision of the bursa;" operative treatment.—In acute cases with severe and increasing pain, loss of function, and lime formation, operation affords the promptest relief. In less acute cases rest in bed with arm abducted should be tried. None of the author's cases in which lime deposit was found was relieved of pain except by operation. "Excision of the bursa" is not the operation called for in his opinion.

Operation.—Patient partly on opposite side. A $2\frac{1}{2}$ to 3 inch incision from acromion downward over greater tuberosity. Deltoid muscle fibers separated and roof of bursa exposed. This caught by forceps and divided in line of incision. Bursa examined, adhesions divided, and any "villous" masses removed. Floor of bursa incised over greater tuberosity and supraspinatus insertion and dissected up from tendon. Any deposit found, fluid or solid, is removed with blunt spoon. Any frayed edges of tendon are trimmed to remove adherent granules. If deposit is not found in the supraspinatus the infraspinatus should be explored. All cases, whether a shadow is obtained in roentgenogram or not, should be explored by incision through floor of bursa to see if the tendon is torn. Wound closed in layers with chromic and plain catgut. The author smears a little vaseline over lining of sac with gloved finger or smooth instrument. Arm is dressed in abduction of about 120 degrees in light plaster-of-Paris spica. This is continued until first dressing in eight or ten days. After cast is removed a small dressing is applied and arm moved a little; is carried in sling and at night placed on pillows in abduction. In three weeks more active movements are made. Full mobility takes from one to three months. Long after abduction is restored some limitation of internal rotation is liable to persist.—(E. H. H. O.)

TROUT, H. H. Autogenous bone grafts versus Lane's plates. *Ann. Surg.*, June, 1915.

The author, while admitting much good has been accomplished by the use of Lane's plates, considers that also a great amount of damage has been done by the indiscriminate use of same by ill-prepared operators. He believes that Lane's plate will eventually be in disfavor, as has been the history of other nonabsorbable material when buried. Inquiry was made of over one hundred surgeons in America and all except seven stated they have had to remove Lane's plates in either their own cases or those of others.

A number of experiments were made on Belgian hares to determine the behavior of small vanadium screws in the presence of infection as compared to autogenous grafts under same conditions. This was not done with any idea of advocating relaxation in the present day rigid aseptic technic in this class of cases. Thirty-five rabbits were used in the first series and twenty-five in the second. Wounds were infected with different kinds of bacteria, many with two or more, such as staphylococci, streptococci, pyocyaneus, *Bacillus coli*, etc. It was found that 92 per cent of the screws had to be removed, while 8 per cent remained and developed sinuses; only 11 per cent of the autogenous bone grafts were removed, while 89 per

cent remained in place and continuous with the rest of the bone, this being proved by X-ray and autopsy after four months. The conclusion reached was: "First, a foreign body is far more apt to give trouble in the presence of infection than an autogenous graft, and, second, an autogenous bone graft will 'take' in a proportion of cases in the presence of various types of acute and chronic infection."

Another series of experiments was conducted to determine the future growth of bone in long diameter when a foreign body is placed in the epiphyseal line, as compared to an autogenous bone peg. A small vanadium steel screw was placed in the epiphyseal line of tibia of 10 young rabbits; an autogenous spicule of bone was placed likewise in 12 young rabbits. Forty per cent of the steel screw cases showed shortening in six months, while none was present in the spicule of bone cases.

The summary is quoted in full:

First. Lane's plate or any foreign material will limit osteogenesis in region of fractures.

Second. In the presence of the various types of infection Lane's plates have to be removed; autogenous grafts seldom do.

Third. Lane's plates placed in the region of the epiphyseal line in the young limit the growth of that bone in the long diameter in a large per cent of cases, while autogenous pegs do not.

Fourth. A certain percentage of Lane's plates have to be removed, whether in the presence of infection or not.—(E. H. H. O.)

COTTON, F. J. A new procedure for the cure of chronic synovitis. Surg., Gynec. and Obst., July 7, 1915.

The author considers that chronic joint hydrops not traceable to infection depends on loss of absorptive power in the synovial membrane rather than persistent oversecretion.

On this basis the operation he has performed in two cases is done with the idea of establishing permanent joint drainage. In both the knee was involved; one side in the first, both sides in the second.

Operation.—Long, curved incision over inner side of knee, high up. Vastus internus exposed, fibers split. Fibrous capsule and underlying synovial membrane incised. Fluid evacuated. Joint inspected for possible pathological lesion; none found. Incision in synovial membrane about one and one-quarter inches. Edge of synovial membrane rolled back and sutured with catgut to the outer surface of the fibrous capsule, thus leaving an opening from joint to overlying muscle. The joint was washed out with salt solution, some being left in cavity. Fibers of vastus internus sutured and skin

wound closed. Posterior straight splint applied; this removed after six days. Allowed to sit up and walk a little after nine days.

In the three knee joints thus treated all symptoms subsided and there was no reaccumulation of fluid.—(E. H. H. O.)

DARBY, L. Report on the wounded in the action between the "Sydney" and the "Emden." Jour. Roy. Nav. Med. Service, 1, No. 3, p. 227.

This account is of special interest as the first that has been received of an engagement of serious moment in which the victor has a tale of serious loss to tell. In the engagements off Coronel, the Falklands, the North Sea actions, etc., the English losses have been total or a negligible minimum and those of their adversaries have not been divulged.

In relative terms of our Navy, the antagonists in this action may be likened inaccurately to the *Olympia* and the *Albany*. The *Sydney* has a displacement of 5,400 and eight 6-inch guns, the *Emden* 3,600 and ten 4-inch. The speeds were originally approximately the same, but that of the *Emden* had suffered from her continuous cruising.

As battle dressing stations on the *Sydney* were the forward and after "ammunition lobbies," with adjoining stokers' bathrooms rigged up as operating spaces. In addition to the hot and cold water supply of the bathrooms, there was an emergency supply in the captain's and wardroom galley. This was fortunate, as the heavy gunfire was soon followed by an impossibly black and muddy tap water.

Wounded began to come down within five minutes after the beginning of the action. All available space was soon taken up by these, and the stretcher party after administering first-aid, removed the wounded to the wardroom, despite the fact that the latter was comparatively unarmored. Luckily no additional injuries were inflicted here. No treatment was attempted other than bandaging, splinting, and free use of morphin, never less than one-half grain, by hypodermic. Operations in the dismantled sick-bay were not possible until the following morning, owing to the general confusion, crowding, and the exhaustion of the sick-bay staff. Volunteer assistants were found for the cleaning, sterilizing, etc., who did remarkably well.

About 80 German wounded were taken over the next day from the stranded *Emden*, whose wounds were practically all very septic, as little had been left available for their comfort on the riddled ship. Sick-bay, wardroom, corridors, and some of the cabins were filled.

Over 100 additional prisoners and 20 Chinamen from a sunken collier were taken aboard that day on an already overcrowded ship.

The operating staff comprised two surgeons of the Royal Australian Navy, one surgeon from the Eastern Extension Telegraph Company's station on Cocos Island, and one German surgeon from the *Emden*. Two days were needed to clear up the urgent operative work, independently of the dressings.—(R. C. R.)

HYGIENE AND SANITATION.

C. N. FISKE, Surgeon, and R. C. RANDELL, Passed Assistant Surgeon, United States Navy.

BANKART, A. R. **Paint poisoning.** *JOUR. ROY. NAV. MED. SERVICE*, 1, No. 3.

A large number of experiments, conducted with different kinds of paints, led to the conclusion that the amount of lead given off with the emanations from fresh paint is too small to cause symptoms of lead poisoning, these results being, in the main, similar to those obtained by leading authorities on this subject, viz, Baly, Armstrong, and Klein in England, and Breton in France. The writer refers to the experiments of Legge and Goadby, who showed that animals were unaffected by long exposure to air passed over white-lead *paste*, but when exposed to lead or zinc paints containing turpentine, or to turpentine alone, the animals very rapidly showed signs of disease—salivation, a tendency to diarrhea, strabismus—whilst the quantity of turpentine in the caged air did not exceed 10 mg. per liter. Symptoms of lead poisoning only occurred when *dust* containing this metal was thrown into the air.

The oxidation products of turpentine are complex, and the noxious principle does not seem to have been established with certainty; carbon monoxid and aldehydes have been suggested as causing the mischief. Bankart is of opinion that "an important point as regards painters on board ship is to recognize the fact that there is danger of poisoning, whenever quick-drying paints and flattings are being used in inclosed spaces, where ventilation is bad, and the air hot and humid. There is, I think, in the anxiety to detect symptoms of lead poisoning, a tendency to overlook those due to turpentine and its substitutes. The paints and flattings now used in His Majesty's service are generally made up with turpentine substitute, which consists for the most part of a light mineral oil. Dr. Rambousch, 1913, points out that 'paints made from petroleum fractions of low boiling point, light coal-tar oils, turpentine oil, etc., are all to be regarded as injurious to health.'

"The precautions taken with regard to painters, both on shore and afloat, appear to be based upon the supposition that they are liable to lead poisoning when they work with lead paints and flattings in confined and ill-ventilated spaces, but it has been found that

acute symptoms are sometimes produced even when zinc flatting has been employed, and doubtless if no metallic base were present the same symptoms would have manifested themselves. These symptoms, as before mentioned, are really not those of lead poisoning at all, but are due to the oxidation products of the vehicle of the metallic base, being turpentine or its substitutes.

"A man who has never before done any painting, after painting for only a few hours in a confined space, may suffer from these symptoms of 'paint poisoning.' My contention is that a painter, provided he takes ordinary precautions, such as washing his hands carefully before eating and wearing an overall, which can be frequently cleaned, should be proof against 'lead poisoning' (painters using a stippling brush, or sand papering, or burning off old paint, should use special precautions, such as the use of respirators), but he may still suffer from symptoms of 'paint poisoning' due to inhalations of the oxidized products produced during the drying of the paint, even though no lead has entered his system. The degree of injury is probably in direct ratio as the rate of volatility of the vehicle employed."—(T. W. RICHARDS.)

NELSON, J. J. H. Sterilization of water by chlorin. Brit. Med. Jour., May 8, 1915.

This is a more detailed elaboration of the process first suggested by the author with Col. F. H. Treherne in the Journal of the Royal Army Medical Corps, October, 1913.

Chlorin sterilization has by now been generally popularized, only varying in the source and generation of the free chlorin. The author uses concentrated hydrochloric acid acting on potassium chlorate tablets, with absorption of the generated gas by water. The latter is contained in an unbreakable 24-ounce bottle, filled up to a mark for 20 ounces, and the chlorin is generated in a small 2-ounce bottle, marked at 2 drams, connected by glass and rubber tubing with the former. Two drams of HCl, with three 5-grain tablets of potassium chlorate, saturate the 20 ounces of water with chlorin in 15 minutes. One ounce of this chlorin water sterilizes in 30 minutes 5 gallons of water, giving a dilution of approximately 1 in 500,000.

The complete apparatus weighs 12 pounds, and contains sufficient material to sterilize 9,600 gallons without replenishing—that is, sufficient water for 1,000 men for 9 days. It is best adapted, however, to practical use by having a water orderly with such apparatus for every 200 men, in which case his supply would last seven weeks.

The cost per month for 1,000 men at a gallon a head is only 5s. 4d., as against £12 10s., the cost of boiling.—(R. C. R.)

HAYHURST, E. R. *The prevalence of occupational factors in disease and suggestions for their elimination.* Am. Jour. Pub. Health, 1915, v, No. 6, p. 538.

As a result of considerable study of hospital and dispensary cases and records, of vital statistics, and of field investigations the author reaches the following conclusions:

Occupied persons, other than agriculturists, suffer an enormous mortality (figures show 74 per cent) from well-recognized preventable and prematurely degenerative diseases.

Occupational diseases exist because industrial health hazards exist. Responsible employers do not realize the existence of either, while treating agencies take little cognizance of employments.

From one-fourth to one-third of the medical afflictions of trades persons are due in whole or in great part to industrial health hazards.

In institutions the vast majority of industrial diseases are lost sight of through failure to properly recognize the industrial relations of the patients, to make etiologic diagnoses, and to classify properly in subsequent filing.

Specific occupational diseases, such as lead poisoning, are not recognized in more than one out of three or four instances, more especially the chronic cases.

Present-day institutional records are of value only in showing the enormous numbers of representatives of groups of industrial pursuits who are below the physiologic normal and who seek medical aid for preventable afflictions. Such records have little value to the student of economics.

A most important first remedy is a proper nomenclature for industrial relations to take the place of the word "occupation." Such a nomenclature is here propounded. The chief feature of this is the introduction of the term "industry-department process" for the word "occupation." Adoption of this proposed term, furthermore, renders a logical classification of occupations possible. No such classification now exists.

The powers and functions of the community health-governing body should be extended to the prompt investigation of all industrial complaints, and to the prompt remedying of them without the necessity of preliminary legislation against certain alleged responsible industries.

In spite of the fact that the State in which this study was made has an occupational disease law, workers are still coming into its charitable institutions from the same types of trades, and in some instances from the same manufacturing establishment, in even greater numbers than at a period three years previous, when the Illinois commission on occupational diseases made its investigation. This, it is charged,

is most directly due to the nonexistence of a correlating body between the hospital and the factory.

Too much importance is usually given to alcoholism, with a failure to appreciate that subjection to industrial health hazards in itself induces and promotes stimulantism.

As a noted health officer has stated, many occupational afflictions might well be made the subject of grand-jury investigations, and others of a coroner's inquest. The enormity of the public and private sums now spent on preventable sickness and death should induce those who pay the tax to bend every effort to run down these contributory factors and abolish them.—(R. C. R.)

YOUNT, C. E. Bismuth paste poisoning—report of a fatal case. *New Mexico Med. Jour.*, xiv, No. 2, p. 51.

The author observes that to-day many surgeons continue to use bismuth pastes in tubercular sinuses, with very little knowledge of their formulas and indications. The possibility of toxic results and the mental picture of the symptom complex, he believes, are little appreciated, not so much due to the scarcity of literature on the subject as to our preconceived ideas concerning the harmlessness of the insoluble salts of bismuth, except as contaminated with arsenic and other impurities.

There are two distinct types of poisoning seen in the use of Beck's bismuth paste:

1. Acute nitrate poisoning.
2. Chronic absorption of metallic bismuth.

The symptoms of the former comprise methemoglobinemia, leading to cyanosis, dyspnea, abdominal cramps, and diarrhea, usually rapid in onset and attended with high mortality. Chronic poisoning includes: (1) Benign, where the violet-black line of the gums is the only manifestation; (2) moderately severe, with stomatitis, more or less acute, becoming chronic, with discoloration of the gum margins and tattooing of the mucosa; (3) a severe form, characterized by a longer duration of the stomatitis, ulceration of the margins of the gums, with intervention of secondary infections and general symptoms, as fever, hiccup, vomiting, diarrhea, and albuminuria.

Treatment consists in rapid evacuation of the paste by warm olive-oil injection and use of suction pump, with supportive measures. Under no circumstances use the curette, as this throws more bismuth into the circulation.

(In the January, 1911, number of this magazine will be found a report of a similar case by Passed Asst. Surg. C. B. Camerer, United States Navy.)—(R. C. R.)

VANDERSLICE, J. W. *The making of a milk commission.* Illinois Med. Jour., August, 1915.

It is of extreme importance that the production of certified milk be under the direction and supervision of the milk commission and no condition should be tolerated that could be interpreted into the assumption of an opposite condition of affairs. The commission must be judicial as well as educational. The commission must be in absolute control of all inspectors. It must not be possible for any question to arise as to who is the employer—the commission or producer. All examiners, inspectors, veterinarians, etc., must be paid by the commission rather than the producer.

The value of certified milk includes the object lesson of the production of a clean, safe, raw cow's milk at a cost within the reach of all. When this most excellent product is contrasted in cost with the exceptional productions of other foodstuffs, the comparison is all to the advantage of certified milk. All have seen the examples of the fruit-growers' art in the display windows, at prices far beyond the ability of the ordinary purchaser to pay. Even in meats the difference in price between the inferior and superior cuts is greater than in milk. Certified milk is preeminently an infant and invalid food—a dependable food for the feeding of persons with delicate digestive apparatus.

The certified milk industry is entirely a voluntary organization from commission to consumer. The value lies not alone in the number of quarts sold per day, nor the number of infants fed, but in the educational influence spread broadcast. It is the entering wedge in the pure-food movement. It has demonstrated its ability to make good. It has raised the grade of all milks far above the fondest hopes of its originators.

The propaganda for certified milk: It is a special milk for a special purpose. It does not compete with market milk. In furthering the use of certified milk there is and should not be any attempt at climbing up by the pulling down of the commercial product. Certified milk sells itself by its own excellence and superiority.

The objects of the commission are to produce a clean, safe, raw cow's milk for clinical purposes, to stimulate the clean-milk movement, to educate the profession and laity to the advantages of their product.

The medical profession should support and encourage the milk commissions by recommending their product wherever milk is used as a beverage.

The milk commission should readily furnish the medical profession at all times full information of any and all details in the production and distribution of its product.

Certified milk is a dependable article of diet. It is the highest grade of milk possible to obtain. Certified milk is surrounded by all the safeguards practical to the production of a milk at a price within the reach of the majority.—(R. C. R.)

HANSEN, H. **Present practice relating to city waste collection and disposal.** Illinois Med. Jour., August, 1915.

The point to be emphasized in connection with the city wastes collection and disposal problems is the highly complex and technical nature thereof. It is eminently an engineering problem, and trained engineers should be called upon in attempting its solution. This is becoming more and more the prevailing practice, and it is rarely that large cities undertake the establishment of wastes collection and disposal systems without expert advice. It is also to be hoped that municipalities will realize the necessity of keeping this fundamental house-cleaning problem out of politics. The proper handling of a wastes collection and disposal department for a municipality requires great skill, and only men of special qualifications either by training or experience, or both, should be sought as the heads of city cleaning departments.—(R. C. R.)

GARRISON, P. E., and SCHULE, P. A. **A statistical study of personal association as a factor in the etiology of pellagra.** South. Med. Jour., August 1, 1915.

In the endemic centers studied 42 per cent of the pellagrous households presented multiple cases. Sixty per cent of the cases occurred two or more to the household.

The age and sex distribution of both first and subsequent cases in the household corresponds roughly with the distribution in general population. Adult females form a considerably larger proportion of first cases in the household than of subsequent cases.

When the first case in the household is a housewife or a child there is a much greater tendency for the development of subsequent cases in children. When the first case in the household is a wage earner, subsequent cases in children are extremely rare.

The time interval between the first and subsequent cases in the household is quite variable. Twelve months is the interval most commonly observed.—(R. C. R.)

EWART, R. J. **The influence of age of the grandparent at the birth of the parent on the number of children born and their sex.** Jour. Hyg., London, July, 1915.

The imperfections of the data analyzed are such that it must be with some considerable hesitation that any decided statement is made

concerning the points discussed. Still, some credence can be given to the belief that those born during the declining years of life do enjoy an enhanced fertility, which may, however, by the time at which birth occurs, be actually neutralized by the low survival value of their offspring.

If it is inferred from the evidence presented that the prenatal mortality affects males more than females, and (a) that infant and prenatal mortality are highly correlated, (b) that infant mortality is higher in the case of elderly parturients and also in the case of parturients themselves the offspring of elderly parents, and (c) that the differential prenatal rate increases as age increases, it must follow that the ratio of male to female births should diminish with the age of the parent. But direct investigation of this point leads, if anywhere, to an opposite conclusion. Hence it must follow that age exerts a direct polarizing influence upon the sexual cell (whether before or after fertilization can not even be conjectured) sufficient to neutralize the factors which make for the production of an excess of females.—(R. C. R.)

PATHOLOGY, BACTERIOLOGY, AND ANIMAL PARASITOLOGY.

C. S. BUTLER, Surgeon, and A. B. CLIFFORD, Passed Assistant Surgeon, United States Navy.

MOOD, G. M. Simple and efficient contrast stain for *B. diphtheriæ*. South. Med. Jour., viii, No. 6, June, 1915.

By the use of saturated alcoholic solution of methylene blue 1 part and hydrogen peroxid 9 parts, which will keep in a well-stoppered bottle for several weeks, the blue is converted by oxidation into methylene red within the polar granules. Small gas bubbles rise for one-half to three minutes, and after these have ceased the smear is dried in the air or with moderate heat. The bacteria are stained a pale pigeon-egg blue, while the polar granules are a bright red; the smears will not be overstained if subjected for one-half hour. This method is adapted to blood serum cultures of from 8 to 18 hours' incubation, but not to throat smears in which the polar granules are seldom noted.—(C. N. FISKE.)

NEWBURG, L. H., and PORTER, W. J. The heart muscle in pneumonia. Jour. Exper. Med., August 1, 1915.

It is very generally believed that the heart muscle is seriously injured in pneumonia and that heart failure from this source is a frequent cause of death in this infection. The experiments presented in this communication show that the cardiac ventricle from

dogs that have died from pneumonia contracts as well as the ventricle from healthy dogs, provided the pneumonic muscle is fed with normal blood. When a normal ventricle is fed with pneumonic blood the contractions are much impaired. If, however, the ventricle from a dog with pneumonia is fed with pneumonic blood, the contractions are almost normal in extent and may be normal in duration.

Thus, in pneumonia the heart muscle is essentially normal, whereas the pneumonic blood is distinctly poisonous to heart muscle suddenly fed with it. In the body during the gradual course of the disease the blood is progressively affected and the heart muscle gradually adjusts itself to the poison with striking success.

The experiments consist of four series of 10 dogs each. In the first the normal ventricle was fed with normal blood; in the second the pneumonic ventricle was fed with normal blood; in the third the normal ventricle was fed with pneumonic blood; in the fourth the pneumonic ventricle was fed with pneumonic blood.

The work done by the ventricular muscle was judged (1) by the length of the period during which the heart contracted, and (2) by the total area of the contractions.

The organism employed was the *B. pneumoniae*. It was passed through three guinea-pigs to increase its virulence to such a degree that 1 cubic centimeter of a broth culture injected into the peritoneum killed a guinea-pig in 12 hours.

CONCLUSIONS.

1. The heart muscle is not functionally impaired in pneumonia, since the pneumonic ventricle beats normally as soon as its food is normal.
2. Pneumonic blood suddenly fed to normal heart muscle lowers its efficiency, lessening the area and the duration of contraction.
3. The heart muscle in pneumonia, exposed gradually to the poison, largely adjusts itself to its poisoned food.—(A. B. C.)

TAYLOR, F. E. The sterilization of vaccines and the influence of the various methods employed on their antigenic properties. Jour. Hyg., London, July, 1915.

Taking the opsonic index as a measure of the antigenic powers of a vaccine, its toxicity corresponding with the negative phase, and its immunizing powers with the positive phase, it was shown with regard to staphylococcal vaccines that:

- (1) Unheated possess no advantages over heated staphylococcal vaccines.

(2) It is unnecessary to limit the amount of heat applied to the minimum that will insure sterilization.

(3) Even so high a temperature as boiling does not destroy the antigenic properties of staphylococcal vaccines.—(R. C. R.)

FLETCHER, W. The Wassermann and luetin reactions in leprosy. Jour. Hyg., London, July, 1915.

One hundred lepers were examined by Browning, Cruickshank, and McKenzie's modification of the Wassermann reaction with positive results in 22 cases. The amount of complement deviated was in some cases exceptionally large.

In a control group of 110 nonleprous persons there were 11 positive reactions.

In only 1 of the lepers was there visible evidence of former venereal disease, but 33 of the lepers admitted that they had suffered from syphilis or from chancres, and of these 33, 13 reacted positively, while only 9 of the remaining 66 gave positive reactions.

In the control group, 21 admitted former syphilitic infection, and of these 8 reacted positively; among the remaining 89, who denied syphilis, there were 3 positive reactions.

There were 12 positive reactions among 44 cases of tubercular leprosy and 10 positive reactions among 56 cases of the anesthetic type.

The average duration of the disease among the 22 lepers who reacted positively was 4 years and 8 months, as compared with an average of 3 years and 8 months for the 78 patients who reacted negatively; but among the latter there were many old-standing cases.

Seventeen of the 22 positive cases were in an advanced stage of leprosy and in some of them the disease was progressing; but among those lepers who reacted negatively there were also many advanced and progressing cases.

Serum from the lesions in 10 of the lepers who reacted positively was examined by dark-ground illumination, but in no case was the *Treponema pallidum* found.

The luetin test was applied to 21 lepers, with negative results in every instance; 13 of these cases gave positive and 8 gave negative Wassermann reactions. The test was also applied to a control group of nonleprous persons selected, because they were likely to be latent syphilitics. In this group there were 11 positive luetin reactions.

THE CONCLUSIONS TO BE DRAWN FROM THE RESULTS.

There were no clinical criteria by which one could foretell the results of the application of the Wassermann test to the lepers who were examined, and, if it be admitted that the positive reactions were

due to leprosy and not to syphilis, it is difficult to understand why some tubercular and some anesthetic cases reacted positively while others clinically similar, did not; or why some actively progressing cases reacted positively while others as active and as progressive gave negative reactions; but because the determining factor in these reactions has not been demonstrated it must not be concluded that this is necessarily latent syphilis.

The number of positive reactions in the group of lepers was double that which occurred in the control group; but in the former a larger number of individuals admitted antecedent syphilitic disease.

A striking feature in some instances, was the strength of the positive reactions given by the leper sera tested, not once only, but on several occasions. The deviation of complement in such amounts as 50 or 30 doses is, at least, a rare occurrence in latent syphilis.

The negative results of the luetin test and of the search for treponemata are in favor of the view that the positive Wassermann reactions were due to some other cause than syphilis.

On the whole it appears probable from the results of this investigation that leprosy, apart from syphilis, may cause a positive deviation of complement when the serum is examined by the method of Browning, Cruickshank, and McKenzie.

Leprosy does not cause the luetin reaction to become positive.—
(R. C. R.)

EYE, EAR, NOSE, AND THROAT.

E. J. GROW, Surgeon, and G. B. TRIBLE, Passed Assistant Surgeon, United States Navy.

SMITH, E. Relation of general arteriosclerosis to certain ocular conditions. *Ann. Ophth.*, January, 1914.

Elsworth Smith, of St. Louis, has put some old facts in an interesting and instructive form in tracing the boundary line where the internist and ophthalmologist meet in their studies of arteriosclerosis and of its effects on the eye. The advice he gives on one subject is so sound as to deserve repetition. It is that "when the conditions in the eye are so grave as to threaten the integrity of the organ the patient should be immediately placed at complete rest in bed, but that if the condition be not urgent enough to demand complete rest in bed then the patient should be urged to pursue the even tenor of his way, free as possible from all sources of worry and strain."—(E. J. G.)

LANCASTER, W. B. Eyestrain and ocular discomfort from faulty illumination. *Ann. Ophth.*, April, 1913.

This article by Lancaster, of Boston, is both thoughtful and suggestive, and a perusal of it in the original will well repay any oph-

thalmologist. He points out that the tendency of our profession is to focus too much attention on the influence of intense light on the eye whilst ignoring the much more important (from a social and economic point of view), because vastly more prevalent, harm done by faulty illumination. He discusses in turn the quantity and quality and the distribution of the light used for working purposes. As to the quantity, he says that while it is important to regulate this, yet the necessity of so doing is sufficiently obvious to prevent much harm being done in the majority of cases. Quality is of importance esthetically, and on grounds of efficiency, but has not been proved to be so as a factor in causing eyestrain. Distribution is of the very greatest moment; exposed lights should be avoided; a light from below is worse than one from above; glare, by reflection from the paper or from the work, should be avoided; troublesome shadows should be eliminated. The indirect method of lighting rooms is warmly praised, as is also the subdivision of the source of light. The cause of the pain and discomfort experienced by those who work under faulty illumination is interestingly discussed under the headings (1) "Excessive muscular effort," and (2) "Hyperemia of the conjunctiva." This section of the paper is as suggestive as it is interesting. The kernel of the argument lies in the explanation that work by deficient illumination demands an amount of fixation greatly in excess of that which is called for under ordinary circumstances. This contention is worked out in a very interesting manner. The paper closes with practical advice as to the home management of our asthenopic patients.—(E. G. J.)

FETTEROLF, G. Hemorrhage from the nose and throat. *Pennsylvania Med. Jour.*, xviii, No. 10.

Hemorrhage originating in the upper air passages is to be distinguished from hemorrhage through the upper air passages, such as the spitting of blood from gastric or pulmonary disease.

Epistaxis, if mild, requires no treatment; if serious, the correct procedure is to locate the bleeding spot and apply treatment directly to the affected area.

To do this properly cleanse the nose, remove all clots, and examine the soft palate and pharyngeal wall to determine if the blood is running down the lateral wall of the pharynx.

The nose is examined next, and the offending side located. Then the head of the patient is turned to the opposite side, so that the lateral walls may be easily examined. Usually the bleeding spot will be found in the anterior part of the septum, in the area known as the locus Kieselbachi.

By applying a 5 per cent cocain in 1:1,000 adrenalin solution the tissues will be blanched, and the veins will stand out.

The cauterization with chromic acid crystals fused over a flame on the point of an applicator will destroy the veins.

If the anterior portion of the septum is not the part causing trouble, the next part inspected should be the anterior end of the middle turbinate. The same procedure will probably check hemorrhage from the turbinate region; but should it not be effective, a pledget of cotton saturated in the tincture of benzoin squeezed dry and firmly applied will check the hemorrhage unless the patient is a bleeder.

Bellocq's cannula rarely, if ever, needs to be used, and then usually in cases of hemorrhage from the nasopharynx. The cases requiring ligation of the external carotid are very rare.

In hemorrhage following tonsillectomy the treatment is divided into two parts—1, prevention; 2, treatment.

Among preventive measures are rest before and after operation and stoppage of all bleeding before the patient leaves the table.

The author strongly recommends swabbing the tonsillar bed with a 10 per cent silver-nitrate solution until all bleeding ceases. If this is impossible, secure the bleeder and pass a suture under it, or if the bleeding is general a pad of gauze soaked in silver-nitrate solution and squeezed until all excess is removed is placed in the fossa and the pillars sutured. The sutures are shot. Packing and sutures are removed in 24 hours.

Treatment.—Vomiting of blood more than once should be reported. The patient should be kept on his side, so that the blood will run into the mouth and not the esophagus.

The color of the patient should be noted and the pulse and temperature taken every hour for five hours. If there is bleeding, the throat should be thoroughly examined and the bleeding area definitely located. Then pads saturated in silver-nitrate solution, the excess being squeezed out, should be held in the fossa for five minutes and then removed.

If this procedure does not succeed after a certain time, the patient should be etherized and sutures inserted.

Hemorrhage from the throat without any marked lesion is frequently due to other than local conditions.

The author believes that hemorrhage from the throat, unless from trauma, ulceration, or neoplasm, practically never exists. Such hemorrhage should indicate a careful examination of the patient's chest.—(G. B. T.)

MAYBAUM, J. L. Diagnosis and conservative treatment of inflammation of the accessory sinuses of the nose. Med. Rec., New York, June 19, 1915.

A single sinus is rarely affected; two or more are usually involved at the same time. Unilateral chronic discharges of pus from the nose

are indicative of chronic sinusitis. Headache is a common symptom, the pain of a supraorbital neuralgia lessens on pressure, while sinus pain increases.

The pain in frontal sinusitis is more intense on rising, decreasing through the day. Transillumination and X-ray examination are helpful in diagnosis, while often repeated examinations of the area affected are necessary to determine the location of the suppuration.

Treatment.—Palliative local measures recommended are the application of a 40 per cent cocain in adrenalin solution to the end of the middle turbinate and the middle meatus, followed by irrigation of the nasal cavity with warm salt solution. Inhalations of menthol 10 per cent solution in hot water are useful.

Superheated air applied to the nasal mucosa is in use at Killian's Clinic in Berlin.

Obstructions to drainage, such as polypi, spurs, etc., should be removed.

The occurrence of repeated acute exacerbations, or cerebral or optical complications, indicate surgical interference.

The author believes the general trend of professional opinion is toward recourse to palliative measures and conservative surgical procedures.—(G. B. T.)

McMURRAY, J. B. Primary carcinoma of the tonsils. *Pennsylvania Med. Jour.*, xviii, No. 4.

Carcinoma of the tonsil is rarely primary; usually it follows involvement of the tongue or pillars of the fauces. It is a disease of advanced life, and an enlarged tonsil, whether ulcerated or not, should be looked upon with suspicion in a patient over 50 years of age.

Glandular involvement occurs early, but not usually before ulceration.

The ulcers are superficial at first, but spread rapidly. The floor of the ulcer bleeds easily and there is a pronounced odor. Pain is constant. Diagnosis can be made by removing a section with a punch forceps and making a microscopic examination.—(G. B. T.)

SPOHN, G. W. Nasal polypi. *Jour. Indiana Med. Assn.*, viii, No. 6.

Nasal polypi are never found on the floor or roof of the nose, and rarely from the septum. The usual locations are the middle turbinate, the ethmoid area, and in the air spaces of the accessory sinuses.

Polypi are degenerated points of nasal mucosa. Zuckerkandl's reports show one out of each eight or nine bodies, examined post-mortem, showed nasal polypi.

Various causative factors are given, usually sinusitis.

Removal by snare is preferable to that by biting forceps. Attention should be paid to the underlying condition.—(G. B. T.)

REPORTS.

TOPOGRAPHICAL EXTRACTS FROM ANNUAL SANITARY REPORTS.

YANGTZE RIVER PORTS.

By C. L. BEECHING, Passed Assistant Surgeon, United States Navy.

During the past year this vessel (*Quiros*) has cruised between Shanghai and Hankow. The climatic conditions of the different ports visited are very much the same, the summers being very hot and sultry, the winters are moderate, and the autumn and spring are very changeable.

The health conditions of Shanghai during the past year have been very good as far as the foreigners are concerned. During the first part of the year there was a mild epidemic of smallpox among the Chinese population; during the summer a few cases of cholera developed among the Chinese; and the last part of the year a more virulent form of smallpox has developed and a few deaths have occurred among the foreign population.

The sanitary condition of Shanghai is the same as in former years, and has probably been reported on in other sanitary reports from this ship.

Shanghai is the best supplied with hospitals of any of the ports that this ship visits. The hospitals which admit foreigners are as follows: The Shanghai General Hospital, the Victoria Nursing Home, the Shanghai-Nanking Railway Hospital, the Red Cross Hospital, and the Isolation Hospital. The Shanghai General Hospital is one of the oldest hospitals in Shanghai and is under the management of the Catholic sisters; they have a very well-equipped operating room, private rooms, and wards. The enlisted personnel of the Navy are admitted to the third-class ward at \$2 Mexican per day, and are in charge of civilian doctors who are on the resident staff of the hospital. The naval surgeon does not treat the cases in this hospital.

The Victoria Nursing Home has wards where the enlisted personnel may be treated by the naval surgeon of the ship to which they are attached, but the hospital has no resident physician to whom

the patient may be transferred in case the ship is ordered away from port before the patient recovers from his illness.

The Shanghai-Nanking Railway Hospital has first-class rooms at \$6 Mexican per day and second-class wards at \$3 Mexican per day. The second-class wards have from four to six patients in them and are very light and airy. The first-class rooms are on the third floor and are very pleasant. This hospital has a resident physician in charge, with European nurses. It also has a fine, large operating room facing on the southeast corner of the building.

The Red Cross Hospital is situated about 5 miles from the Bund and is under the control of the Harvard Medical School of China. They have a very competent staff of American physicians in connection with the school and hospital.

The Isolation Hospital is reserved for contagious diseases and admits both Europeans and Chinese. At this hospital the case is in charge of the doctor who brings it into the hospital. In addition to these hospitals there are several that admit only Chinese.

Chinkiang is the next port of interest that the *Quiros* visited. It has a small foreign concession, which is situated on the river front. One hospital is found here which is accessible to foreigners; it is in charge of the doctor of the port, who is an Englishman and a very good man. The hospital is situated on a hill and is equipped for emergency work only. There is also a Chinese hospital for Chinese women and children. The climate of Chinkiang is the same as in Shanghai, but the hills make it a little more pleasant during the hot summer months.

Nanking is a treaty port about 200 miles up the river from Shanghai; the sanitary conditions prevailing are the same as for Shanghai. There are several hospitals for Chinese, and the Nanking University has a medical school in connection with their hospital. Until the last year there was no hospital for Europeans who lived in Nanking, but Dr. Macklin, who has lived in Nanking for the last 20 years, donated a small tract of land and the different missions clubbed together and built a three-story building, which they have made into a hospital. This is called the Memorial Hospital, and is open only to Europeans. It is in charge of a foreign nurse, who is assisted by native nurses. The hospital will accommodate about 12 patients when completed; at the present time they have four private rooms, one for confinement cases. They also have a small ward for isolation cases. The operating room is fair; it has a northern exposure. The sterilizer is a small one, which would be inadequate if very much operating was being done. The prices are \$5 Mexican per day for private rooms; this includes board, ordinary drugs, and nursing; doctors' fees are extra. For the use of the operating room, \$10 for a minor operation, \$25 for a major operation, and \$5 for an ordinary

confinement case; these prices are in Mexican currency. No house surgeon is connected with the hospital, but several good physicians are available, who will take over a case if the vessel is called out of port. This hospital is about 5 miles from the Bund, off which the ship is usually anchored, and is very inconvenient for the use of the gunboats, but even so, it is much better than before, when there was no hospital available and patients had to be sent to Chinkiang or Shanghai. Shanghai is about six or seven hours by train from Nanking.

The first part of the year there was a very severe epidemic of smallpox in Nanking among the Chinese. It is said by people who have lived there several years that the mortality was about 50 per cent. A few cases occurred in the foreign population. Schistosomiasis is very prevalent among the Chinese, and Dr. Brown, of Nanking, informed me that they had found a few cases in Europeans. At the University Hospital they have been treating the cases with salvarsan, but the results of the treatment could not be said to be entirely curative. During the past autumn typhoid has been more prevalent among the Chinese than usual. One physician informed me that at that time (October and November) they had in the hospital more cases of the disease than they had had during all the preceding year. Malaria, dysentery, and syphilis are very prevalent.

Kiukiang, a treaty port, is situated on the south bank of the river about 440 miles from Shanghai. This port has one hospital which is open to Europeans, called the St. Vincent's, and under the management of Catholic sisters. It consists mainly of small buildings, and is devoted mostly to Chinese, but they have four private rooms and one ward. They also have an isolation ward for contagious diseases. The operating room is poorly equipped. There is one hospital for Chinese women and children. This is in charge of Dr. Mary Stone, a graduate from the University of Michigan. She also has a training school for nurses in connection with the hospital.

During the first part of the year there was an epidemic of smallpox among the Chinese. I was informed by Dr. Lambert, who is the doctor of the port, that schistosomiasis and malaria are very prevalent in the vicinity of Kiukiang.

Hankow is a treaty port situated just below the mouth of the Han River, where it flows into the Yangtze. The ship was in Hankow only a few days during the year and only one hospital was visited by the medical officer. The International Hospital is the principal hospital open to foreigners; it is a very well equipped institution. Malaria and dysentery are very prevalent in Hankow and the surrounding country.

One case of schistosomiasis, intestinal, developed in a member of the crew. The patient gave a history of having gone in swimming

in a fine, clear pool of still water in the vicinity of Kiukiang. The urticarial stage of the disease was so slight that the patient did not report to sick-bay. The fever and tenderness in liver and splenic region did not develop until about five or six weeks after exposure. The ova of the *Schistosomum japonicum* were found in the stool of the patient while he was in the hospital at Nanking. Later amebas were also found. The patient recovered under emetin treatment.

CAPE HAITIEN, HAITI.

By C. P. LYNCH, Assistant Surgeon, United States Navy.

The town of Cape Haitien is located on the northeast coast of the Republic of Haiti, and has a population estimated to be about 30,000 people. With the exception of 250 white people, the population is entirely made up of the negro race, who are descendants of the old French colony. This city at the present time is made up of dilapidated buildings and ruins, which is all the remaining evidence of a former prosperous French possession.

The entrance to the harbor is by a narrow channel, which widens out to form a well-protected harbor on the inside. The highest part of the town is built up to the foothills, which gradually slope to the water front, all streets running parallel or longitudinal to the latter. The gradual elevation of the land from the water front affords ample drainage by surface sewers directly into the harbor.

Climate and temperature.—There are no marked changes in the range of temperature. There is no intense heat during any period of the year. The coolest season comes during the wet seasons, which are two in number, one occurring during the months of April and May, and the other during the months of September, October, November, and December, an immense amount of rainfall taking place during these months.

The following table gives the temperature and rainfall for each month of the year 1913:

Month.	Temperature.		Average rainfall.	Days of rain.
	Maximum.	Minimum.		
	° C.	° C.	Mm.	
January.....	27.4	20.2	3.9	3
February.....	27.5	20.1	1.6	3
March.....	28.6	21.2	38.3	2
April.....	27.0	20.9	304.8	14
May.....	28.1	20.8	191.9	11
June.....	29.4	22.3	10.9	5
July.....	29.8	22.2	0.6	1
August.....			42.2	4
September.....			80.2	5
October.....			98.7	5
November.....	28.0	22.3	223.6	14
December.....	26.3	22.6	157.7	10

Water supply.—The principal water supply is obtained from springs in the surrounding mountains which flow through the mains by force of gravity into two large reservoirs. These have a combined capacity of 400,000 gallons, receiving their principal water supply from the Typhaine Spring, back of Hospital Justinien, and Belaire Spring, which is above the cemetery. These springs lead to the two reservoirs by large stone and concrete conduits; other smaller springs have pipe leads to the reservoirs.

The reservoirs are built of stone and concrete and are of very good architecture and are well ventilated by pipes located in the tops of the reservoirs.

The water from these two reservoirs is distributed to the town by two large mains, which are connected by smaller mains. Very few residences and public buildings are supplied with hydrants. The principal distributions are from public hydrants, from 15 to 20 in number, located in various parts of the town. The supply from these reservoirs being inadequate, the water is turned into the mains from 6 a. m. to 9 a. m. each day during the dry season for use by the inhabitants. During the wet season the supply to the mains is open throughout the day. This water is considered by the population of Cape Haitien to be potable and safe. However, when one considers the number of leaks, which are numerous in the street mains, and the presence of surface sewerage, this water is very likely to be contaminated with harmful agents from the outside which gain entrance to the mains at the time the water supply is cut off.

No systematic inspection of the pipe lines seems to be carried out, and these leaks will in some future time be the source of distribution of an epidemic disease.

The lack of water from the reservoirs causes a large percentage of the population to rely on surface wells and cisterns for water. As a rule these wells and cisterns are located in close proximity to the privies, which are built over large cement vats. Many of these wells and cisterns are highly contaminated with human excreta and are a constant source of danger.

Drainage and sewage.—The gradual elevation of the land from the water front affords ample surface drainage. This drainage is conducted to the harbor water by open gutters of various structure, the latest being built of cement and stone. The majority of residences have a small surface drain which leads to the street, and in many sections of the town where the gutters are in bad condition numerous cesspools exist and are a constant source of danger and annoyance.

The immense amount of rainfall and sunlight no doubt removes many of the harmful agents contained in this surface sewage. The majority of residences and business houses have outhouses built over

large cement vats. These vats do not receive periodic cleaning and disinfection, also they are not water-tight, and as a consequence the contained material seeps to the outside soil and eventually gains entrance to the wells and cisterns, which are usually located in close proximity to the privy.

No epidemics have been attributed to this system of sewage; however, it seems to be only a matter of time until such diseases will become epidemic from this source among the inhabitants of this city.

Sanitation.—The sanitary condition of this port is bad, and no measures are enforced to prevent the spread of disease. The constant revolutions and existing financial conditions of Haiti no doubt have a depressing influence on the adoption of more modern methods of sanitation. No quarantine or health regulations exist in this port. The natives are filthy in their homes as well as in their personal habits. Especially is this noticeable in the homes of the poorer class, where they live in overcrowded huts, open to flies and various other insects.

In homes where privies are not provided the feces are passed in streets or yards. The city has built a number of privies along the water front extending over the water. These places are used by both sexes and are a beneficial sanitary measure for the native population in this vicinity. However, no such places exist in the upper section of the town, and human excreta passed in these districts is carried along with the surface drainage to the water front.

A system of garbage collection exists and is fairly well carried out, the garbage being dumped into the sea along the water front.

The city affords one large market house which is of modern structure, being built of galvanized iron. The floor is made of cement and has waterways for flushing purposes, which, however, does not seem to be carried out.

Food sold in this place is unprotected and usually an inviting habitat of the numerous flies.

The slaughterhouse is of modern structure and is maintained in a good sanitary condition. Animals for slaughter come from the surrounding country and are usually in good condition. No inspection of animals slaughtered here is enforced.

Food supply.—The climatic conditions and the fertile soil of the surrounding country supply an abundant amount of fruit throughout the year. This fruit consists chiefly of pineapples, bananas, oranges, grapefruit, etc., all of which are of good quality and cheap. Chickens and eggs are plentiful and cheap. Hogs and cattle for slaughter are plentiful. The meat is of fair quality and cheap in price. Staple articles of food are imported.

Diseases.—In spite of the present sanitary conditions no epidemic diseases exist in this port at the present time. Malaria cases are

reported to be numerous; this is doubtful. During our visit here no prophylactic measures were adopted and no cases of malaria developed in any member of the ship's company, many of whom were on duty ashore for a period of 21 days. Yellow fever has been known to exist in this port for many years. Typhoid fever is said to exist in rare instances. Cases of elephantiasis are numerous; many beggars suffering from this condition are to be seen throughout the city. Venereal diseases are prevalent throughout the town, especially lues; tertiary manifestations of this condition are frequently noted among the native population. Salvarsan is not used in the treatment of syphilis by the local doctors. Tuberculosis is present in the native people, but cases are not reported as numerous. The immense amount of rainfall and sunlight no doubt have a marked influence in the reduction of diseases in this port.

Disease carriers.—The anopheline and culicine mosquitoes are present; however, they are not as numerous as one would expect. Flies are numerous throughout the city. Swine are at large throughout the town, and it is probable that they convey contaminative material from one section to another.

Hospital.—The Hospital Justinien, in charge of and maintained by the French Sisters of Mercy, is the only hospital the town affords at the present time. This institution is an old structure, one story in height, built of brick and stone, consisting of two wings, the center being utilized as a chapel. Each wing is divided into wards and semiprivate rooms, one side for female patients and the other for male patients, about 50 beds being available for use in each wing. The beds are small, made of iron, and have straw mattresses, other furniture in the wards and rooms being of wooden structure. No operating room exists, all surgical operations being performed in the wards or rooms.

The institution does not afford a sterilizing equipment, ordinary ovens and boilers being utilized for this purpose. Surgical appliances, instruments, and dressings are deficient.

The attending staff consists of native physicians, all nursing being done by the French Sisters of Mercy.

During my visit to this place a number of surgical cases were in the institution, chiefly gunshot wounds, which were infected, due in most instances to the primary treatment and deficient surgical equipment of the institution.

The kitchen is located at the end of one of the wings of the building, and is clean but open to flies.

The hospital, as a whole, is clean and is maintained in an orderly fashion, the lack of equipment and space being the largest items to contend with for the proper care of patients.

SANTO DOMINGO AND HAITI.

By E. A. VICKERY, Passed Assistant Surgeon, United States Navy.

SANTO DOMINGO CITY.—Santo Domingo City is the capital of the Republic, situated on the southern coast of the island, and has a population of about 18,000.

The general health conditions are good, no cases of contagious diseases being present, special inquiries being made regarding yellow fever, plague, and smallpox. There was a moderate amount of malaria and a great deal of venereal disease, 38 cases occurring among this command during a stay of about five weeks.

The water supply is rain water, which is collected from roofs and stored in cisterns. No intestinal diseases occurred among the regiment as the result of drinking this water, nor was there any information secured which would lead one to believe that it was common in this city. A moderate amount of malaria prevailed, although none occurred in the regiment.

There is a military hospital in the fort about which no information could be obtained. There was an insane hospital, situated in a ruined church, which contained about 30 or 40 cases, some of which were confined in cells and stocks. The conditions were primitive, but the inside of the hospital was fairly clean. There was a leper hospital which at the time of my visit contained 86 cases, male and female, collected from all parts of the island. These were in all stages and afforded an interesting pathological study. This hospital is also fairly clean. There is another hospital for medical cases which I did not visit because of its more or less private nature.

Water from springs and wells on the other side of the river from the town was unsafe and showed evidence of organic pollution on chemical analysis.

PUERTO PLATA, SANTO DOMINGO.—The following information was obtained in August, 1914, from personal observations and inquiries from the native doctors. At this time there were no epidemic diseases, special inquiry being made regarding plague, yellow fever, typhoid, diphtheria, scarlet fever, and measles. There was a moderate amount of malaria and dysentery, the latter, according to one of the native doctors, being of the amebic type. Venereal diseases were said not to be excessive, although, as no liberty was granted in this port, this did not fall under my personal observation.

The water supply was derived from a spring or reservoir situated in high land about 3 or 4 miles south of the town and is piped into town through an 8-inch water main, which is exposed in various places.

A good hospital has been erected about a half mile from the center of the town on high land, but this was being used as military head-

quarters at this time. The town itself was reasonably clean and well kept.

SAN PEDRO DE MACORIS, SANTO DOMINGO.—In the latter part of August, 1914, the following information regarding health conditions was obtained by personal observation and through inquiries from an American doctor, Dr. Barry. There were no epidemic diseases present at this time. A moderate amount of malaria was present, one case occurring on the U. S. S. *Marietta* during a stay of three months. Venereal diseases are present in moderate amount.

The water supply consisted of rain water collected from roofs during the wet season and stored. Dr. Barry assured me that this water after filtering was perfectly potable and pure. The town itself was fairly well kept and clean. The medical officer of the U. S. S. *Marietta* informed me that there were numerous mosquitoes in town, many of which were of the species *Stegomyia calopus*, but that yellow fever had not been present for many years.

PORT AU PRINCE, HAITI.—This is a city with a population estimated at about 60,000 and is situated on the western end of the island, at the head of a landlocked bay.

Information regarding health conditions was obtained by personal observation and through inquiries from a French doctor. General health conditions seemed to be excellent, in spite of the fact that the town was very dirty. It has a surface sewage system and the rains keep the city from being worse than it is.

No epidemics prevailed, special inquiries being made regarding yellow fever, plague, and smallpox. A moderate amount of malaria is always present, and there are also cases of intestinal derangement, called "intestinal fever" by the local doctors. This seems to be something similar to typhoid fever, except that it has a duration of only about two weeks and the mortality is much lower. The water supply is piped into the town from various sources in the mountains. Some of the pipe lines are open to the air and some of the water taken from various sources in the town showed evidence of organic pollution.

Hospital facilities were very limited. I was told that there was only one small hospital in the city, with a capacity of only about 30 beds. There were, however, numerous well-situated buildings which could be used as hospitals. No liberty was granted in this port and information regarding venereal diseases is lacking, but I was told that venereal diseases of all kinds were prevalent, and the general morality of the city is low.

VERA CRUZ, SANTO DOMINGO, AND HAITI.

By R. W. PLUMMER, Surgeon, United States Navy.

VERA CRUZ.—Vera Cruz, before the bombardment on April 21, was a clean and well-lighted city. Its water supply and sewage sys-

tem were adequate for the demands of over 40,000 people. When the city was occupied and its municipal departments disorganized there was naturally much uncleanness and disorder. The topography of the land in and about Vera Cruz is not well adapted to natural drainage. Pools of water collect during the rainy season and serve as breeding places for mosquitoes. Malaria, therefore, is endemic away from the thickly settled portion of the city. Dysenteries and diarrheas are prevalent and infection carried by flies. The dysentery is of bacillary type. Tuberculosis is very prevalent and smallpox cases occur in great numbers.

Vera Cruz is far more sanitary than most of our American cities. The high death rate per 1,000 among the civil population could easily be brought down by the advent of better trained medical men.

The medical officer failed to note but two cases of typhoid in three months among the civilian population of Vera Cruz. A clean water supply from a clean source shames most of our American municipalities. South Philadelphia is a reeking filth hole compared to the worst sections of Vera Cruz.

SANTO DOMINGO CITY.—This town, strange to relate, has greatly improved. Fine roads are being built in the city and environs. A beautifully paved boulevard now runs for 40 miles from Santo Domingo City to the Jaina River and soon will be projected across the island to Monti Cristi.

Typhoid fever is prevalent. Our old tropical friends, malaria, leprosy, filariasis, and tuberculosis are common. The food is good. Excellent beef is obtained, freshly killed in large quantities. Good lettuce, tomatoes, peppers, yams, squash, radishes, onions, and corn can be obtained. Good oranges, alligator pears, limes, and pines are plentiful. Bananas are poor.

PORT AU PRINCE, HAITI.—Even this town shows a touch of improvement. Some streets have been paved and good roads about the city are more numerous than formerly. Many diseases are prevalent; leprosy, filariasis, malaria, tuberculosis, and intestinal parasites are most common. A fever resembling in all its clinical manifestations a paratyphoid is common. Lack of proper equipment for studying serum reaction prevented further research.

Many vegetables of good quality can be obtained. Meat supply is not good. The fruit is excellent; bananas, grapefruit, alligator pears, melons, mangoes, pines, zapotes, and pomegranates are plentiful.

SANTO DOMINGO.

By J. B. HELM, Assistant Surgeon, United States Navy.

SANCHEZ, SANTO DOMINGO.—This is a town of about 1,500 inhabitants, located at the head of Samana Bay, just at the base of a moun-

tain range which is about 1,200 feet high. The surrounding country inland is very mountainous, but toward the sea it is very low and marshy. There are two rivers emptying into the head of this bay near this town, the Una and Boracoota. No portion of the town is subject to overflow, as it is located about 20 feet above sea level. The town is the usual filthy tropical village with no sanitary facilities. Rain water is used exclusively. The water is caught from roofs of houses and run into cisterns or tanks on the surface. There are very few cisterns, most of the inhabitants using tanks. A few private homes and business houses have small filters, but, as a rule, the water is used as it comes from the tank. There are no diseases attributable to the use of this water. There is no sanitary sewerage system. The town has a natural advantage in being located among hills at the base of a mountain, and is well drained during the rainy or wet seasons. Privies of a primitive type are a common nuisance, but are usually located over a gutter so that they are cleaned when it rains. However, during dry weather the odor from these, as well as those not located over a gutter, is extremely bad. Sanchez is the northern terminal of a railroad which runs inland to La Vega, a distance of about 40 miles. The railroad shops are located here, and most of the inhabitants are connected with railroad work. The surgeon of the company is located here, but his facilities for caring for surgical cases are very poor. There are no hospitals in the town.

AZUA, SANTO DOMINGO.—We visited this port twice, but only for a few hours each time. The city proper is located 3 miles from the sea in a hilly region, and is of about 5,000 people, with no sewerage system. Rain water is used and is stored in barrels, tanks, and a few cisterns; there are also two or three wells in the city. The most important thing learned was that during certain months it is very dry, and their only source of water supply is from a small river a few miles from the city. Trips are made for water twice daily, using donkeys. Each carry two kegs secured to each other across the saddle and which are to be filled with water. This is a mountain pass, and wagons can not be used. On arrival in the city, the inhabitants are given the amount absolutely necessary for cooking and drinking. The city sanitation is *nil*, the inhabitants slovenly and dirty, living in huts with no floors, their food scanty and coarse; but notwithstanding this, disease is not prevalent, and from what can be learned the death rate is no higher than at any other place on the island.

SANTO DOMINGO CITY, SANTO DOMINGO.—This is a city of about 20,000 inhabitants, located at the mouth of the Ozama River, about 40 feet above sea level. The surrounding country is hilly. It is about 30 miles to the range of mountains which run completely across the island from northwest to southeast. The Ozama forms the eastern boundary of the city, where it empties into the sea. No

portion of the city is subject to overflow. Well water and rain water stored in cisterns and surface tanks afford the city its drinking water. There is sufficient rain during all seasons for this purpose. There are no reservoirs for storage of water, no waterworks, or filtering plant.

There are only two sewerage lines in the city. They serve to carry refuse from the streets in the business section; there being screened openings from the gutter of the street into the sewer. These sewers discharge by gravity into the sea and are never flushed. They are adequate at all seasons. The only method of disposal of human excrement is by cesspools, the cesspool and cistern often being located very closely together. The odors coming from these cesspools in different parts of the city are extremely bad. The residences are one-story as a rule and are not properly ventilated. The streets are kept in fair condition owing to the frequent rains and the natural decline of the city toward the sea. Garbage is either dumped into the sea or used to fill low places on land. Notwithstanding the extremely insanitary conditions of the city there are no diseases existing in epidemic form.

A large percentage of the Americans in the city live at the Receptoría. This is controlled by the receiver general of Dominican customs under the American-Dominican treaty of 1907. It is a large building of 20 rooms located upon a hill outside the walled city. The rooms are large and well ventilated. The plumbing throughout the building is modern. It is furnished with evaporator and distiller, cold storage, gaslights, and has an incinerator. The sanitary conditions are excellent.

There are four hospitals in the town. The Hospital Beneficencia has a capacity of about 125. It is well located, fairly well equipped, and kept in good condition. There are five separate wards, women medical, women surgical, men medical, men surgical, and a tubercular, with a few private rooms. These wards are each located in a section of the building, the sections separated by an open space of about 20 by 35 feet. This space is supplied with benches and serves as a recreation place for convalescent patients. The building itself is one story and is poorly ventilated. The operating room is fairly well equipped and quite a little minor surgery is done, especially the giving of salvarsan intravenously by needle puncture. The diagnosis and treatment of syphilis is carried out on clinical symptoms altogether, as their laboratory equipment amounts to practically nothing. The writer has had two patients from the U. S. S. *Castine* in the hospital, one of whom was given salvarsan intravenously. No abdominal operations are attempted. This is a charity hospital, controlled by a civilian society and supported by a lottery scheme, as are all the hospitals in the city, except the military hospital.

The Hospital Beneficencia admits patients only on a charity basis, but when the writer's patients were in the hospital the city was under siege by the revolutionists, the hospital was short of food and funds, and an exception was made in that we were allowed to pay at the rate of about \$1 per day for their subsistence.

The military hospital has a capacity of about 80. This hospital is poorly equipped and kept. The writer obtained permission with difficulty to visit this hospital during the month of July, when it was overflowing with men who had been injured during the late revolution. There were a few abdominal and head injuries, but nearly all were of the extremities. Little attention was paid to surgery, the treatment principally consisting of plain dressings. This hospital treats only federal soldiers.

The hospital for the insane has a capacity of about 90 and an average of about 75 patients. Very little attention is paid to the treatment of patients.

The leper hospital is located within the walled city. There are 25 cases of leprosy, of nerve, skin, and mixed types, at present in this hospital. The authorities are not strict as to keeping these people isolated. Their food is scanty and coarse, and no systematic treatment is carried out.

Tetanus is said to be extremely prevalent in Santo Domingo City, but the writer has seen one case only, which was in a local hospital. Tetanus antitoxin is used freely both as prophylactic and as curative, it often being used as a prophylactic measure immediately after parturition.

Santo Domingo City was under siege by the revolutionists from about the middle of July until the latter part of August. During this time all who resided on the outside of the walled city were requested to come inside, in consequence of which the theaters, churches, and other available buildings were used to house these refugees. The conditions were extremely insanitary and food was scarce. Fortunately no epidemic of disease occurred. No fumigation was attempted in these buildings when the occupants returned to their homes.

BLUEFIELDS, NICARAGUA.

By C. P. LYNCH, Assistant Surgeon, United States Navy.

Bluefields, Nicaragua, has a population estimated to be 3,500 people, the greater part of this population consisting of the negro race, who in former years migrated to this country from the British possessions in the West Indies. The white people of the town are approximately 100 in number.

The town of Bluefields is located on a quadrangular area of land, 4 miles from the bar or entrance to Bluefields Lagoon. This is a large and, in the greater part, shallow body of water covering an area of about 10 square miles which serves as a wide mouth for the Bluefields River; a stream which is navigable for the smaller fruit vessels for a distance of 60 miles into the interior. The Bluefields Lagoon on the west side is shallow, and vessels requiring over 3 or 4 feet of water can not navigate farther than a distance of 3 or 4 miles from the landing in Bluefields, the transfer of freight and passengers to small power and sailing vessels taking place at Bluefields Bluff, 4 miles from Bluefields.

Climate.—The temperature ranges from 70 to 80 degrees during the cooler season and from 80 to 95 degrees in the warmer season. However, there is no great variation in temperature, the coolest months being November, December, and January and the hottest being June and July. During our stay in this port the temperature ranged from 77 to 85 degrees in the months of August and September. Rainfall is plentiful throughout the year, the most pronounced wet season being throughout the months of September, October, and November.

Water and water supply.—No municipal water supply exists in this port, and the chief source of water is obtained from rain water from the roofs of buildings, which is stored in wooden or metallic cisterns. The greater number of these cisterns are unscreened and are a breeding place for mosquitoes as well as being open to contamination from the outside. Surface and deep wells are available for use in the dry season, and no doubt are highly contaminated with human excreta as well as numerous other agents existing in their locality. While no epidemics have been attributed to infection from contaminated water, such diseases are known to exist, especially amebic dysentery and typhoid fever, and it is very probable that one or both of these diseases will become rampant among the inhabitants some time in the future.

Drainage and sewage.—The town, being built on hills, affords ample surface drainage during the wet season in the greater part of the residential districts, and this, combined with the large amount of rainfall, no doubt has a marked influence in decreasing the liability to diseases from such source. Many undrained pools are to be seen, especially along the water front and in the business district.

The town does not afford a municipal sewerage system; however, many of the residences and business houses are supplied with sewerage; the other houses which are not supplied with such apparatus depend on surface drainage and poorly constructed outhouses built over large vats. These houses do not receive proper periodic sanitation and are dangerous, insanitary agents for the propagation of

disease by flies, swine, and other disease carriers. In many instances refuse is thrown any place which may be convenient, and ultimately finds way to the streets for distribution to other districts.

Sanitation.—The sanitary condition of the town is far from being what it should be, and in spite of the fact that no efforts are made to prevent the spread of disease, the general health of the community is fair considering the existing conditions. The health officer of the port resides in Bluefields Bluff and does not have any control over the sanitary conditions of Bluefields in so far as sanitation is concerned.

The natives, as a rule, may be considered to be fairly clean in their habits and homes; this, however, is not uniform throughout the town, and many are to be seen who inhabit filthy homes and are careless in their personal habits.

A system for the collection of garbage exists and seems to be fairly well enforced, although the containers for the garbage are left on the streets or sidewalks without covers, and part of the garbage finds its way to the street and is open for flies, etc.

The slaughterhouse is a large frame building built over the water and is freely ventilated. The flooring is made of wooden boards separated by sufficient intervals to permit free flushing with water after being used and is in good sanitary condition. No inspection of animals slaughtered here is enforced.

The market house is a large wooden building, fairly sanitary and clean. It is unscreened and open to flies and other insects.

Food supply.—All food is high priced in this town, with the exception of beef, which is of a fair quality, animals being driven in from the surrounding country for slaughter.

Eggs and chickens are scarce and high—eggs 7 cents gold each, chickens 75 cents to \$1 gold. Fruit is to be had throughout the greater part of the year; this is high priced, as it comes from the interior, and transportation is difficult.

Diseases.—As a rule no epidemic disease exists in this port. The most common disease is malaria, which is very prevalent throughout the town and surrounding country. Quinin and salvarsan are used uniformly by many physicians here, and no doubt reduce the morbidity from this source. Tuberculosis is the next on the list, and has a high mortality among the inhabitants. Venereal diseases are numerous and cause a great many invalidisms, especially lues. During our stay here an epidemic pertussis was present, and this disease and its complication broncho-pneumonia were causing a high mortality among the infant and child population. Sporadic cases of amebic dysentery make their appearance from time to time, most of which come from the interior. Seven cases of typhoid fever were reported during the ship's stay in this port.

Disease carriers.—Mosquitoes are very numerous, especially the anophelinæ, and thrive throughout the town, a sufficient number of cesspools and the large body of water, Bluefields Lagoon, with an abundant amount of undergrowth on its banks in the immediate vicinity of the town, serving as mosquito breeders. Flies are plentiful, and are constant sources of annoyance and danger. Many swine run at large in the streets, and it is probable that they carry infectious agents from one section to another, as their existence seems to depend wholly on garbage, refuse, etc.

Hospitals.—The town of Bluefields has one hospital, which is a large frame building located on the highest point in the western part of the town. It is maintained by the Government, and the majority of patients are in the employ of the latter, the hospital being especially used by the Army.

The hospital is in charge of a superintendent, who is a native civilian. The medical supervision is in charge of a salaried surgeon, who has control of all patients; no other physicians are on the attending staff, and no physicians can attend or have a patient in this institution without permission from the civil authorities or surgeon in charge.

The building consists of two stories, having a veranda running three-fourths of the way around the building. Ventilation is free and adequate, furnished by windows and two large hallways which extend through the longest part of the hospital.

The hospital has a capacity of about 80 patients, the majority of beds being in wards, others in semiprivate rooms. The beds are of the small single, iron, hospital type. Furniture in the rooms and wards is deficient, boxes and improvised tables being utilized for dressing tables, etc.

The operating room is on the ground floor and has a sufficient amount of natural light. The operating equipment is inadequate, a cheap operating table, three basins, a small linen sterilizer and instrument boiler making up the equipment. Very few instruments are included in this equipment, but the existing ones are in good condition.

The dispensary is neat in appearance, has a fair stock of drugs, and is in charge of a pharmacist. The nursing staff consists of untrained male natives. Very few women patients are admitted to this institution, and when such are present female attendants are obtained from the outside, who also are ignorant as to the care of patients.

The diet kitchen is located in a separate building back of the hospital. This place is filthy, unscreened, and located in close proximity to the privy, which is built over a large vat and is open to flies. The water supply is cistern rain water.

To take the hospital as a whole, it is filthy and insanitary. However, with the expenditure of a small amount of money and a reorganization of the management, it could be made a valuable asset to the town and surrounding country.

Drugs and surgical supplies are high priced in this port. One drug store supplies a complete stock of vaccines and salvarsan, all of which are high priced.

ALASKAN PORTS.

By W. S. PUGH, Jr., Surgeon, United States Navy.

The towns of Unalaska and Dutch Harbor are situated in the same harbor and are about 1 mile distant from each other. This harbor is well protected, being surrounded by mountains, some of which are 3,000 feet high.

UNALASKA.—The population of this place is, as near as I can see, about 150 people, most of whom are half-breeds. They appear to be short and rather stunted. The general population appears to be fairly healthy. No special prevailing diseases. Occupation, general fishing. Diet, largely of fish. Temperature is very damp; much mist and fog. Water supply is from hill reservoirs.

DUTCH HARBOR.—This is really an island separated from Unalaska by a small creek. The United States wireless station is midway between the two towns. Dutch Harbor represents the relics of a once busy place. There are about 30 buildings in the town, consisting of good residences, stores, and hotels, all in good condition but no longer of any use, as very little business is now done here.

THE PRIBILOFS.—St. Paul, an island in the Behring Sea, is about 20 miles long and 1 mile wide. The island is evidently of volcanic origin, as much of the ground and rock is unmistakably volcanic. Prevailing winds appear to be northerly and at times very high. In winter the velocity is often 80 to 90 miles an hour and people can not stand up in front of it. The thermometer reaches from about zero to 25° F. in winter, and in the summer, from June to September, the temperature ranges from 40 to 45° F. The snowfall during the winter months is heavy. There is no snow in summer, but a fine rain falls most of the time and the dampness is very penetrating.

Water supply.—The water supply is from a few deep wells and is very bad, indeed, and the water may well be classed as polluted. At times it is very salty and is only used of necessity. The possibility of the water supply becoming infected is very great, as I shall show later. No drainage or sewage is in existence. Each house has a cesspool within a few feet of the dwelling, and into this everything

is thrown, and as a result most of them are filled to the seats. When they are filled up the excrement is then deposited on the floor. These places are never cleaned, and as a result the condition is beyond description. As many of these toilets are near wells, the possibility of infection is very great.

The population of the island is at present 197 people, the remains of a mixed race which is slowly dying out. Last year there were 11 deaths and 8 births. The houses are filthy and are never cleaned. Windows are never opened, and the odor is stifling. On entering a bedroom one finds that the bedding has never been washed since it came from the mill, and sometimes 10 or 12 will sleep in a bed. Underneath the bed is decomposing seal meat in various stages of decomposition. Any new diseases being introduced here would wipe out the place.

Tuberculosis.—Of its 197 people 98 have tuberculosis with positive t. b. sputum, and of the others many have glandular and other forms of tuberculosis. About 80 per cent of the population are tubercular.

Syphilis.—The evidences of syphilis are noted everywhere, mostly tertiary lesions and as old, broken-down gummatas, nerve lesions, ulcers, interstitial keratitis, and the like. I personally saw every individual, and I think that 60 per cent would give a positive Wassermann.

Gonorrheal vaginitis.—This is very common, and much of it I believe is contracted in infancy and carried through life. Where one member of the household gets it all the women get it. I suppose that much of the sterility is due to infantile vaginitis. This is spread by contact in bed and by towels, as nothing is ever washed. The natives vigorously oppose any attempts to have them keep clean or clean up their houses.

The officers in charge of the island have no disciplinary power and can not enforce any orders. The natives have been so much pampered in the past they are now worthless. Money is no object to them, as the Government gives them everything they want, and of course they will not do any work unless it is absolutely necessary.

Skin diseases.—Skin diseases are very prevalent, and I saw some beautiful examples of uncommon lesions, many showing such a mixture that it is hard to tell which is which.

KODIAK.—Kodiak is a small town in St. Paul Harbor; population is about 500, mostly half breeds. It is well protected from the winds by the high mountains in back. The water supply is excellent, coming from the mountain lakes and streams. The common diseases are syphilis and tuberculosis; the two are often coexistent. Old syphilitic lesions are common, particularly those of the nervous system. Alcoholism is common among the natives; they manufacture their

own liquor, no one being allowed to sell them whisky. They really do not seem to care about whisky, as their beverage is much stronger. There are about five buildings in the town which could be used as hospitals; the store and storehouse of W. J. Eskine could be used as 20 and 50 bed hospitals, respectively. The church and dance hall would accommodate about 30 beds apiece. The little story-and-a-half hotel would accommodate about 30 people. The harbor is excellent, and there is no difficulty in getting supplies. There are numerous streets and roads, and the town is in good condition. The temperature seldom falls below zero.

WOOD ISLAND.—This island is just across the bay from the town of Kodiak. Climatic conditions are about the same as Kodiak. It is on level country, only a few feet above tidewater. There is a schoolhouse that could be utilized for a 50-bed hospital.

The Baptist Orphanage located here has about 45 children, almost all of whom show lesions of hereditary syphilis. The medical officer was called upon to treat most of these children during our 35-day stay in this vicinity.

CORDOVA.—A town of about 1,000 people, situated on a hillside at the mouth of the Copper River. The temperature was about 45° F. during our stay here. Rain falls most of the time in summer and snow in winter. Population is almost entirely of whites. Water supply is excellent and obtained from glacier streams. The usual diseases of an American town are noted. Two hospitals are located here. One, an old barn which is in bad condition, of about 100-bed capacity, is conducted by the Copper River Railroad. The city operates the other hospital, which is situated just beyond the wharf. This building will accommodate some 20 beds, and at present is unoccupied. There are numerous buildings in the town which could be utilized as hospital buildings.

SITKA.—The present population of Sitka is about 600 natives and 150 whites. Water supply is excellent and obtained from mountain streams. There are two hospitals, one the Old Pioneer's Home, of 10-bed capacity, formerly the marine barracks. Dr. Johnson's Hospital will accommodate about 10 patients. Numerous other buildings could be used as hospitals. The usual diseases are syphilis and tuberculosis, which prevail very extensively among the natives. There is very little illness among the whites. The rainfall of Sitka and, in fact, throughout Alaska is very heavy in the summer season.

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